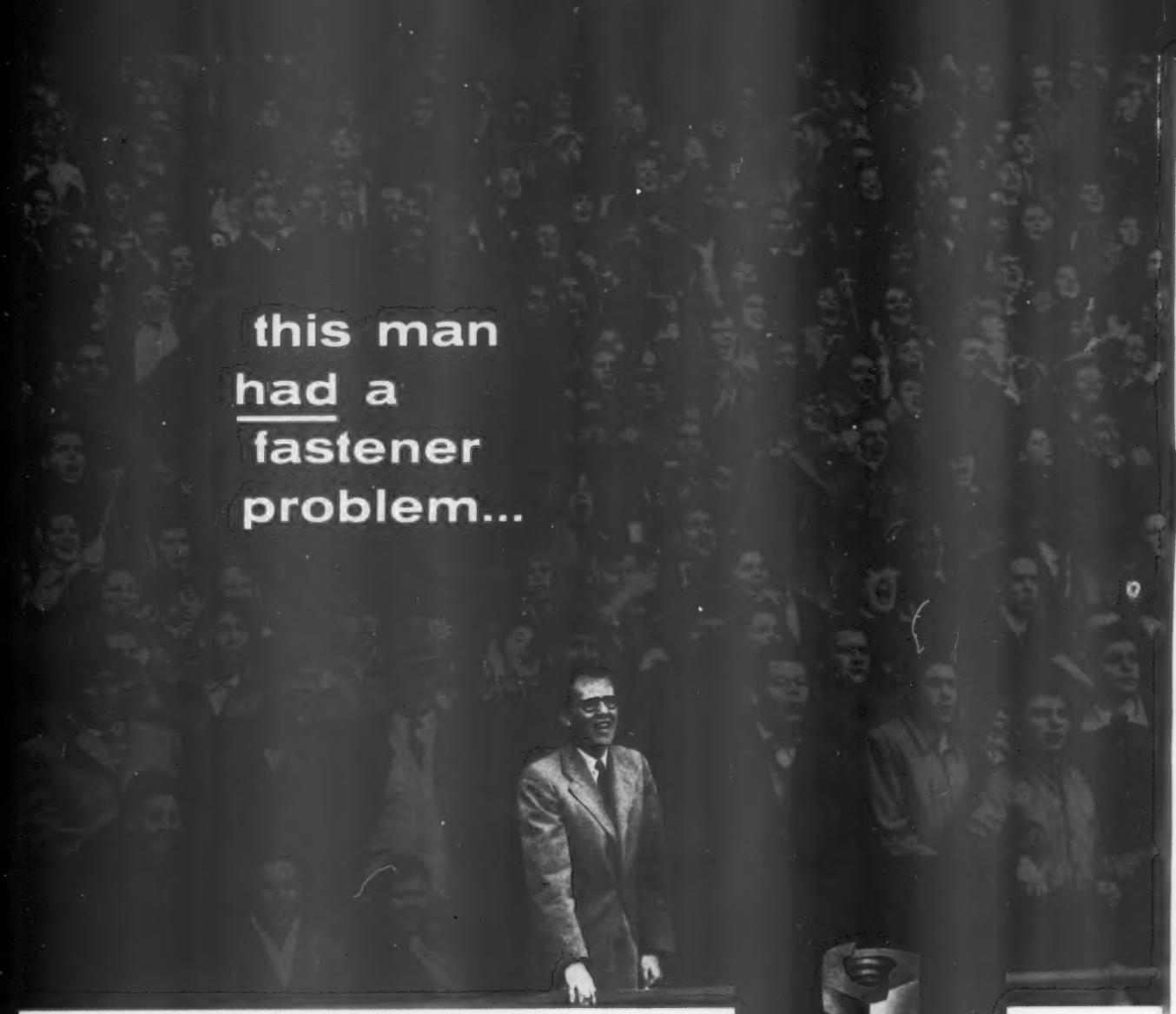
A HITCHCOCK PUBLICATION

assembly & fastener ENGINEERING

MARCH • 1961 • 50 CENTS

selecting power drivers for threaded fasteners

HOW AUTOMATIC ASSEMBLY CAN HELP YOU • CLEAN-ROOM FOR MISSILE-GUIDANCE ASSEMBLY



and here's how Pheoll solved it

He's just a voice in the grandstand now — but as an official of a shoe company he himself recently quarterbacked a major victory. Faced with a fastener problem he called the signals that brought in the Pheoll team.

Briefly, the problem was one of redesigning a nut used in holding a stud to a football shoe cleat. In its original "straight notch" design, the stud often worked loose under game conditions.

In producing football cleats, screws are built into the bottom sole of the shoe. These screws have flat washers which "cut" into the sole to keep them from turning. Here, a special "One Way Hex Nut"— developed and produced by Pheoll — is tapered and notched at the same angle, but in opposite direction to the notches in the washer. The nut rides in over the top of the washer and as it is turned down, it tightens and binds — forming a positive lock that can't ride or work loose.

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Enlargement of One Way Nut

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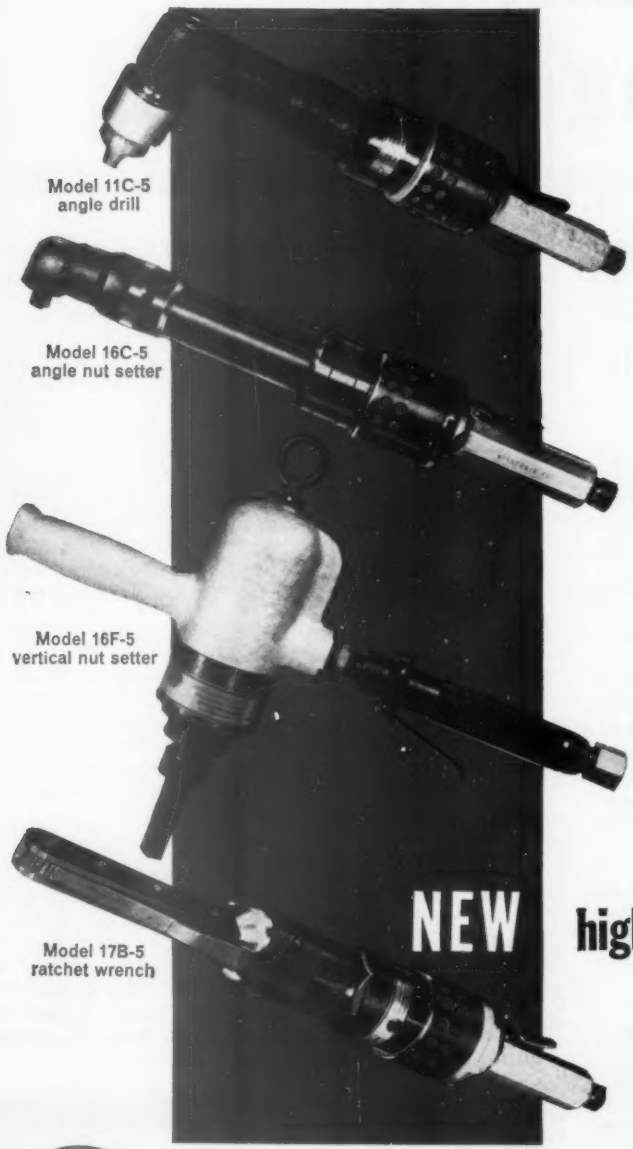

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Function Factor formula developed to assess working quality of thread-cutting screws

Unbiased laboratory tests demonstrate superior performance of Parker-Kalon thread-cutting screws in cast iron, steel, aluminum and plastics.

To compare the actual working quality of thread-cutting screws under laboratory conditions, a series of simple yet thoroughly dependable tests were made using P-K Types "F" and "B-F" and competitive thread-cutting screws. These tests can be easily duplicated by any engineering department that would like to determine their own results.

The test was based on the premise that (1) the better a screw resists failure after being driven home, the stronger the assembly, (2) the easier the screw is to drive, the less wear there will be on driving tools and upon the operator and (3) thread failures either on the screw or in the work, gives rise to costly, time-consuming salvage operations as well as other intangible production costs.

Thus, a measure of evaluating the performance of thread-cutting screws is the ease of driving combined with the degree of resistance to fastener failure. The relationship between these two functions is referred to as "drive-strip ratio."

How the tests were conducted

Random sizes of samples purchased on the open market from a variety of sources (including the P-K Types "F" and "B-F") were identified solely by letters. Manufacturer's names were not revealed to the technicians who were responsible for making the investigation.

As a means of fairly evaluating the performance of the screws, they were applied under identical conditions in sections of cold rolled steel, cast iron, aluminum castings and general purpose plastics. Similarly, hole sizes as well as depth of penetration of the screws were identical.

Each screw was driven by a specially designed Detroit torque testing machine.

To limit and control depth of penetration, washers were placed under the screw heads. Screws were inserted in the hole in the part (steel, cast iron, aluminum, plastic) and the part placed in the jaws of the machine. The screw was driven until it cut a full depth thread. The maximum driving torque was recorded at this point.

Failure Point The second phase of the test was to determine the amont of torque which could be applied to the fastener before (1) the screw failed in section or (2) when the screw failed in the engagement material. This failure point was then recorded in inch-pounds, whereupon a direct comparison of the several screws could be made.

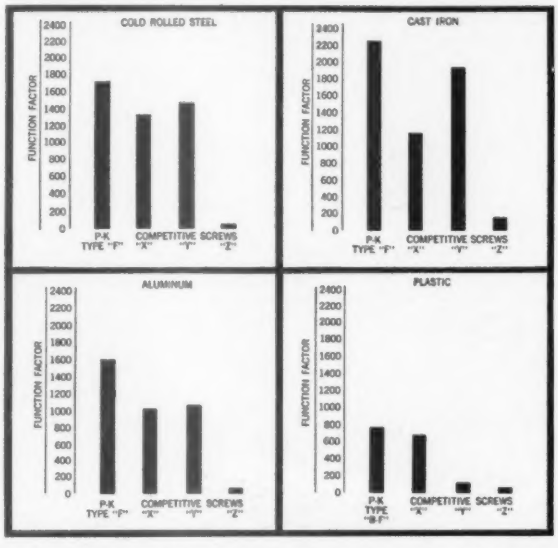
Function Factor In order to assess the working qualities of each screw that was tested, a formula was devised that would express these functions. DRIVE TORQUE was the average of driving torque values obtained from individually running a given number of screws in the application. STRIP TORQUE was the average of a given number of strip torque values obtained from the ultimate failure of the screws in section or of the threads in application.

The formula is expressed as

Formula $$\text{Function Factor} = \frac{(\text{Strip Torque})^2}{\text{Drive Torque}}$$

P-K® thread-cutting screws average 108% better working qualities than the 3 competitive types tested.

Charts shown are typical samples and represent in each case only one of the many tests run on each screw. Identification of screws tested was made only upon completion of test.



Designed to reduce pressure development in the engaging section by as much as 80%, P-K Types "F" and "B-F" thread-cutting screws are manufactured with five cutting flutes. The completely formed threads have sharper cutting edges and flutes are of continuous depth.

Lower Drive Torque

Together these new P-K features make for better clearance of the accumulated material and *assure lower drive torque*. They also sharply reduce the possibility of stripping, galling and other causes of screw failure.

Use Recommendations

P-K TYPE "F"

P-K TYPE F The new, improved P-K Type F (Patented), is a hardened thread-cutting screw developed for use in granular or brittle materials such as ferrous or non-ferrous castings and bronze or brass forgings. It may also be used advantageously in structural steel and sheet metals when it reduces driving torque and resists shear and tension loads and in impregnated plywoods where it grips with rugged strength. The pilot with its five tapping flutes cuts a machine thread as the screw is turned in—does the job with complete dependability—stays tight and secure.

P-K TYPE "B-F"

P-K TYPE B-F For plastics, P-K recommends the new improved "Pentap", Type B-F (Patented). This exceptionally efficient thread-cutting screw combines the five thread-cutting flutes of the P-K Type F with the coarse-pitch, widely-spaced threads of the P-K Type B screw. Thus it distributes cutting pressure evenly, lets chips drop to the bottom of the hole and prevents cracking of the material. The B-F is designed for making fastenings to comparatively thin sections and bosses in friable and brittle plastics.

SPECIAL FOR NYLON P-K TYPE L

P-K TYPE "L"

For this very popular material, only Parker-Kalon has a completely new tapping screw—especially developed for use in nylon. It is called the P-K Type L (U.S. Patent 2,350,346). The Type L functions as a combination thread-cutting and thread-forming screw in that it cuts a small amount of nylon while allowing the full diameter of the threads to form. The new P-K Type L offers a particular advantage in nylon assemblies which must be disassembled for service because the Type L can be readily removed and replaced without stripping or galling.

USING THREAD-CUTTING SEMS?

SEMS

Specify P-K, and get thread-cutting screws with a higher drive-strip ratio, *plus* the added holding power of a pre-assembled washer!

P-K Sems are readily available with a wide variety of washers pre-assembled to thread-cutting screw types "F" and "B-F". They may be ordered with slotted, Phillips or Hex heads. They can be hopper fed for automatic driving. Inspection rejects due to omitted lock washers are impossible. Fastenings stay tight and firm.

P-K Sems reach your assembly line pre-assembled, ready for instant use. They assure concentric washer seating—washers cannot come off. Double inventory and parts handling is completely eliminated.

P-K Sems are also available with a wide variety of washers pre-assembled to thread-forming and machine screws.

Use the Function Factor formula and prove to yourself that Parker-Kalon thread-cutting screw types F and B-F consistently perform at a higher drive-strip ratio. Their use will increase production efficiency and reduce the "in-place cost" of fasteners in assembly operations. Production run samples may be obtained from your P-K Distributor, or write direct to the Parker-Kalon Sales Engineering Department.

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assembly & fastener ENGINEERING

Better Design and Engineering for Assembly

March, 1961 Volume 4, Number 3

FEATURES

Selecting Drivers for Threaded Fasteners—Part 1 26

First of two articles presents yardsticks for selecting power drivers. Discussion of clutches and tool applications will be continued in April.

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Six factors in evaluating an engineering proposal to purchase automatic assembly equipment.

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• For some yardsticks to use in determining which power tool to drive which fastener, turn to the article starting on page 26.

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Letters to the Editor

"Leaning Tower of Pisa"

This is in regard to the "Leaning Tower of Pisa" shown in Rudy's column on page 40 of your January issue. This is a novel solution. However, further consideration should be given to this problem, namely, the use of a countersunk screw, inasmuch as a round-headed screw obviously prevents entrance at the street level without the use of an elevating means as shown by your solution on page 67.

John C. Walker
C. Neil Vann
Design Engineering
Advanced Structures
Narmco Manufacturing Co.
La Mesa, California

Aluminum Harness Boards

In reference to your December issue, we are interested in the article, "Perforated Aluminum Boards Economize Harness Assembly". We request information as to whom to get in touch with for more information.

Charles B. Ricker
Electrical Engineer
The Soundscriber Corp.
North Haven, Connecticut

I am seeking further information as to the vendor's name and address and/or further information.

D. E. Stanton
Industrial Engrg. Dept.
IIT Federal Division
Fort Wayne, Indiana

Could you please send additional information to me at your earliest convenience?

R. S. Snipes
Engineering Associate
Western Electric Co.
Winston-Salem, N.C.

• Further information on these boards may be had by contacting the Raytheon Company, 103 River St., Waltham 54, Mass.

Audio-Visual Assembly Systems

Please send several copies of the article, "Will Audio-Visual Systems Obsolete Straight-Line Assembly", which appeared in your November issue?

J. E. Duquette, Manager
Production Engineering
The Magnavox Company
Fort Wayne, Indiana

I am interested in information in this field of audio-visual training in general, and specific applications as made by the Hughes and Northrop aircraft companies. Any help will be greatly appreciated.

Robert M. Waite
Time Study Department
Pitney-Bowes, Inc.
Stamford, Connecticut

• We suggest you contact the Hughes Aircraft Company, El Segundo, Calif., and the Nortronics Division of Northrop Corporation, Hawthorne, Calif.

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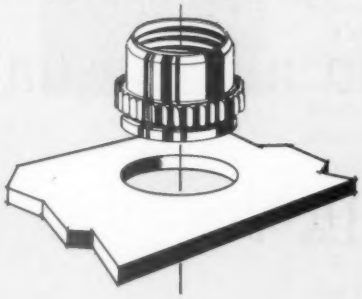
INSTALLATION COMPARISON

ROSÁN PRESS NUT



1. Drill or punch one hole.
2. Press or hammer into place.

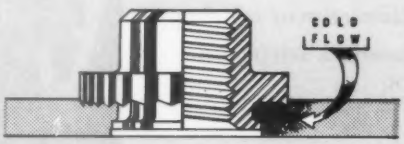
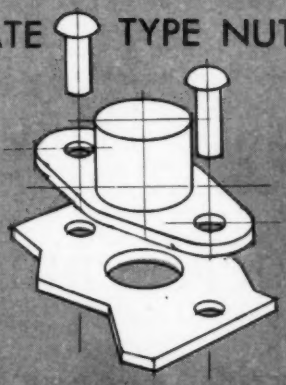


PLATE TYPE NUT



1. Drill or punch major hole.
2. Drill or punch attachment holes.
3. Countersink attachment holes.
4. Deburr major hole.
5. Attach plate nut with assembly hardware.
6. Align rivet holes.
7. Install rivets and drive same.
8. Remove assembly hardware.

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THE EDITOR'S VIEW

MARCH, 1961, VOL. 4, NO. 3

THE PROPOSED SCIENCE ACADEMY—A BUREAUCRATIC FOLLY?

Bureaucracy is hard to arrest and contain. It recognizes no boundaries, and keeps spreading into new areas. One of the latest examples of this can be seen in the bill introduced into Congress to set up a government-sponsored National Science Academy.

The avowed aim of this legislation is to help increase the nation's supply of engineers and scientists. There is no argument here, because there is more and more of a demand for top-notch graduates in these fields. But to set up a federally-sponsored school to help achieve this end is foolish.

We agree wholeheartedly with Paul H. Robbins, executive director of the National Society of Professional Engineers, who recently stated:

"Our colleges and universities are presently capable of handling considerably more engineering and science students both at the graduate and undergraduate level. A federally sponsored institution of higher learning would only serve to suplicate facilities, to say nothing of the drain the proposed Academy would have on the already short supply of qualified instructors and professors."

How true! Already there are too many vacant seats in the classrooms of our existing engineering schools —despite ever-increasing over-all college enrollment.

What is really needed are more ways and means of getting more of our bright high school and undergraduate college students interested in the sciences and engineering. As it is now, it would be folly indeed to set up a National Science Academy to compete with existing engineering schools (both private and state) for a dwindling supply of prospective students.

Since the proponents of this bill evidently have not made a thorough study of the problem, we can't help but wonder if their bill is not the result of a bureaucratic compulsion to spend more and more tax money so as to extend federal activity deeper into both private and state affairs.

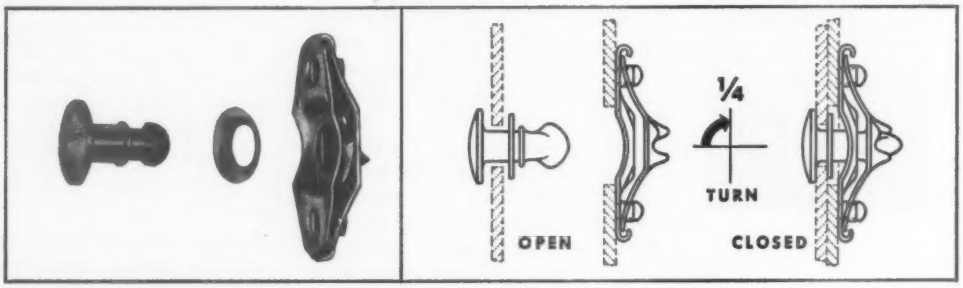
Matt E. Hennessy

Editor

THIS PANEL CAN BE
OPENED OR CLOSED
IN LESS THAN 2 SECONDS

LION ¼ TURN OPEN ¼ TURN CLOSED FASTENERS

ARE FAST, POSITIVE, RELIABLE



Installation of the three parts of the Lion Fastener, shown above, is quick but not critical. Unique in design and performance, these mil spec (MIL-F 5591A-ASG) fasteners make possible quick access and smooth positive locking by only a ¼ turn.

ALIGNMENT NOT CRITICAL

Both stud and receptacle "float" to accommodate misalignment. The hole, which retains the stud, is twice as large as the stud cross-section. This permits a float of .070 in all directions. The leaf spring receptacle also floats to accommodate stud position.

WIDE VARIATIONS IN STACK HEIGHT

Total sheet thickness may vary as much as +.035 and −.015 without affecting operation. A Lion stud, specified for .160 total thickness, for example, will accommodate any stack height between .195 and .145.

SWAGED-NOSE STUD

Extra strength and smooth operation are made possible by the swaged-nose design. All the metal in the stud goes to work. There are no thin cross pins, holes or milled slots to weaken the cross-section. Case hardening is further assurance of long, trouble-free service.

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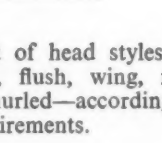

Send for your free copy of Southco Fastener Handbook No. 9. Gives complete engineering data on Lion Fasteners and other special fasteners. Write to Southco Division, South Chester Corporation, 257 Industrial Highway, Lester, Pennsylvania.

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LION *Aviation* FASTENERS

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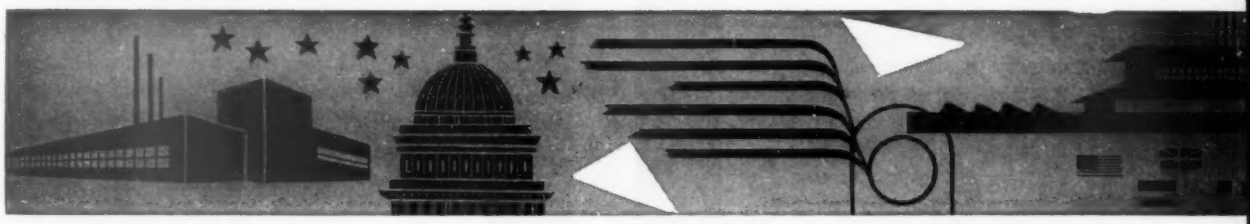
The State of Business



DATA HANDLING—AID TO MORE EFFECTIVE MANAGEMENT

by **William G. Alexander**
President
Ryan Transdata, Inc.

The storage and retrieving of data is one of the major problems faced by anyone contemplating work in the information handling field. Classification and indexing is a very formidable problem, and one which must be properly solved if we are able to go back into our file and retrieve the significant data we desire. There is no surer way of losing data than to insert it in a file without proper indexing and cross-referencing. A detailed look at almost any business, government agency, or scientific center will reveal many concrete examples showing this need for improved methods of making vital data available.

Anytime anyone suggests putting an information handling or paper work automation system into a company or government office, he immediately hits the block of guardians of the capital investment handbook. It does cost money to study the problems, to install the equipment and to conduct the trial run. All of these steps must precede the reaping of the benefits of the system.

Although there are many roadblocks, too often, unfortunately, the other side of the coin is not examined. It is a fact that the cost of not knowing is even higher than the cost of putting in a system that would let us know.

In the U.S. alone, we pay one billion dollars every year for outright duplication of research and development effort in doing over again the things that have already been accomplished.

Up to six billion dollars a year of R&D effort is misdirected because of a lack of knowledge of previous work. In other words, doing things differently from the way in which they would have been done, had the scientists and engineers been fully aware of prior work in the field.

If the scientists and engineers could start with a full knowledge of the current state-of-the-art, we would in effect add up to seven billion dollars per year of vital research and development to the U.S. fund of knowledge, without spending one extra cent.

Russia is not asleep in this area. They have a seven story information retrieval headquarters in Moscow with a highly organized worldwide network of inputs. The center processes and makes immediately available to their research scientists abstracts on books, research papers, magazine articles, patent disclosures and even newspaper articles on impending research from all over the world.

Alexander has a widely diversified experience in electronics, engineering, manufacturing and marketing. A pioneer in aircraft radar work, he is a senior member of the Institute of Radio Engineers. He became president of Ryan Transdata in 1960.

We hear many alarming stories about the need for increased emphasis on training scientists and engineers in the U.S. I agree that this is a vital thing; however, we are in a critical phase in our technological war with the communist world and need to take action which will yield immediate results. Giving our hundreds of thousands of existing experienced engineers and scientists the benefit of immediate, easy access to data generated by prior research would be equivalent to adding 50,000 experienced man years of effort to our research and development each year.

Information handling systems will never replace the technical library for broad background on any subject, however, an automated information system can offer an easy way of directing the researcher to the proper reference source for background and then supply current data on the subject rapidly and in an easily digested manner. The raw material for information systems is data.

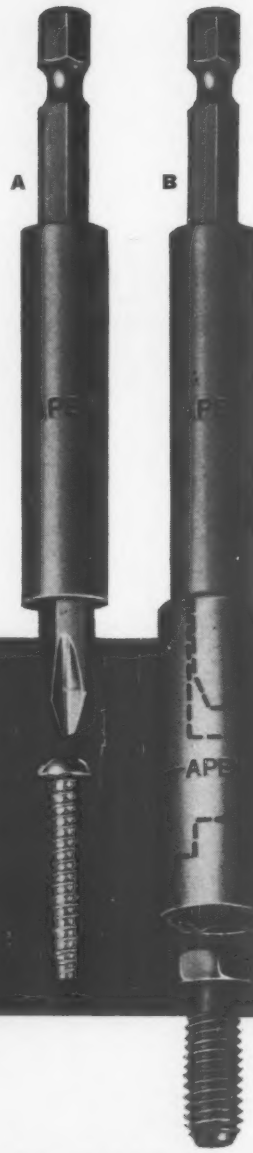
Data is used primarily for the transmission of intelligence from one place or person to another. It is also used in the process of deci-

continued

In assembly and fastening work, a tool operator may be driving screws one minute, running nuts the next.

To keep this work moving right along, you could use two power tools, or one power tool equipped with a slip chuck, to interchange bits and sockets.

But the best way to make one tool do two different jobs is to use an Apex socket that slips right on over the bit —in just seconds you're ready to run down nuts and bolts. The socket can be removed just as quickly when it's time to drive screws again. The Apex method makes for better, safer work, too, because there are fewer accessories on the tool and consequently far less wobble and looseness.



This APEX Socket converts a screwdriver into a nut runner ...in seconds!

Apex—the authority on fastening—offers the most complete line of standard and magnetic fastening tools, plus an array of specials that have solved some of the most unusual fastening problems. Write, on your company letterhead please, for

CATALOG 30-A
Nut Running Tools, ¼" to ⅝" hex, square drives.

CATALOG 30-B
Nut Running Tools, ¾" to 3½" hex, square drives.

CATALOG 30-C
Screwdriving Tools.

A. Apex M-490 Magnetic Bit Holder, with ¼" hex shank Apex Insert Bit to drive Phillips screws. Bit holder available in non-magnetic type.

B. Apex WJ-196-F Socket, to run 7/16" hex bolts, nuts. Solid hex shank on insert bit provides firm connection for ¼" female hex drive on socket. Socket available in magnetic type.

SCREWDRIVING • NUT RUNNING • SPECIAL

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sion making, or as a record for storage and future reference. This process of making timely, intelligent decisions has presented a challenge throughout history and the task is growing more difficult as our society and the data describing it become more complex.

The successful solution of the information retrieval problem can result in a substantial increase in the effectiveness of the group using it. Technical decisions will be completed at less cost and will represent more advanced technology. Government and military operations will be more effective.

The average business can realize equally satisfying financial results from the use of advanced information retrieval, data entry, and presentation techniques. There are three million firms in the U.S., of which 2.94 million employ less than 100 people per firm. The U.S. Government issues many reports, bulletins, and statistics which, when properly digested and related to a specific business, constitute a powerful planning tool.

These small firms simply cannot afford expensive information-retrieval systems which would make available to their decision-makers results of internal operations, government reports, industry statistics and related government and industrial research results, even though such data would make them more competitive. Ryan Transdata is designing systems aimed at cooperative area information-retrieval, which will effectively bridge this gap.

Those systems are possible now. The problem in trying to sell such a system is that it is difficult to prove the potential savings in terms acceptable to a controller. The cost, however, must be stated in cold hard terms, and the first cost is high. This condition will slow down integrated information systems growth, but it will not stop it.

In 1950, the computer industry was simply a novelty, today it is a giant. By 1975, the computer industry will merely be a segment of the broader information systems business. Transmission of data over communications lines will exceed their use for conversation. •

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With so many things going at jet-power and rocket-speed, it is no wonder that designers and manufacturers are constantly looking for short-cuts, for cost-reducers, for longer life, for efficiency, for product improvement, for profit betterment. The adaptation and adoption of ELCO Cold-Headed Special parts can often gain many of these searched-for advantages. The cold-headed parts shown here are all recent outputs of ELCO engineering brains, planning know-how, and production experience. *If a particular part here interests you, mark it; then tear out this advertisement and send it to us.* We will tell you the whole story on that part, so you can decide if you want something like it. Send us prints or samples of parts you are now using—we would be pleased to quote. *Ask about the services of our process engineering department.*

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HOW TO BE SURE YOU GET THE RIGHT TOOL FOR THE JOB

Call in your Rotor Analyst. Have him study your assembly work. He has the know-how. He has the complete line of assembly tools. His recommendations are unbiased to give you the right tool for the job.

Call the nearby Rotor office or write for bulletin. The Rotor Tool Company, 26300 Lakeland Blvd., Cleveland 32, Ohio.

ROTOR ASSEMBLY TOOLS

TYPES: Screwdrivers, nutsetters, impact wrenches, angle wrenches, stall tools.

CAPACITIES: From No. 1 screw to over 1"...0 to over 300 ft. lbs.

SPEEDS: Wide range...the *right* speed for your job.

CLUTCHES: Direct, positive, adjustable (cushion), RotorK or impact.

Here's the RIGHT TOOL for YOUR job!

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ROTOR HIGH-CYCLE ELECTRIC TOOLS: Grinders • Polishers • Sanders

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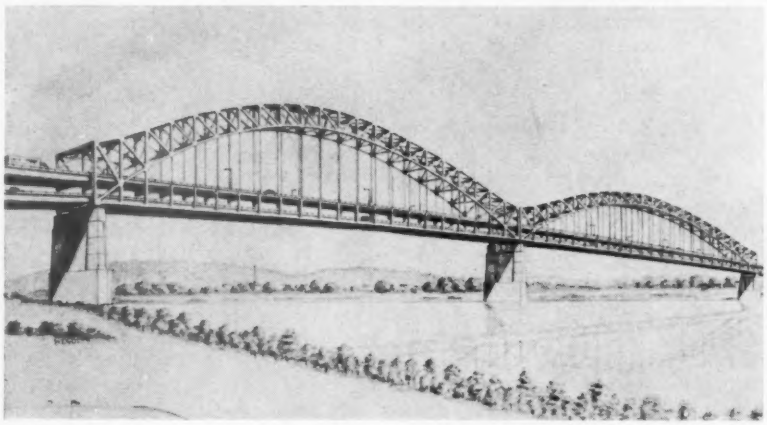
Ideas and Field Reports

USE HIGH STRENGTH BOLTS IN BRIDGE CONSTRUCTION

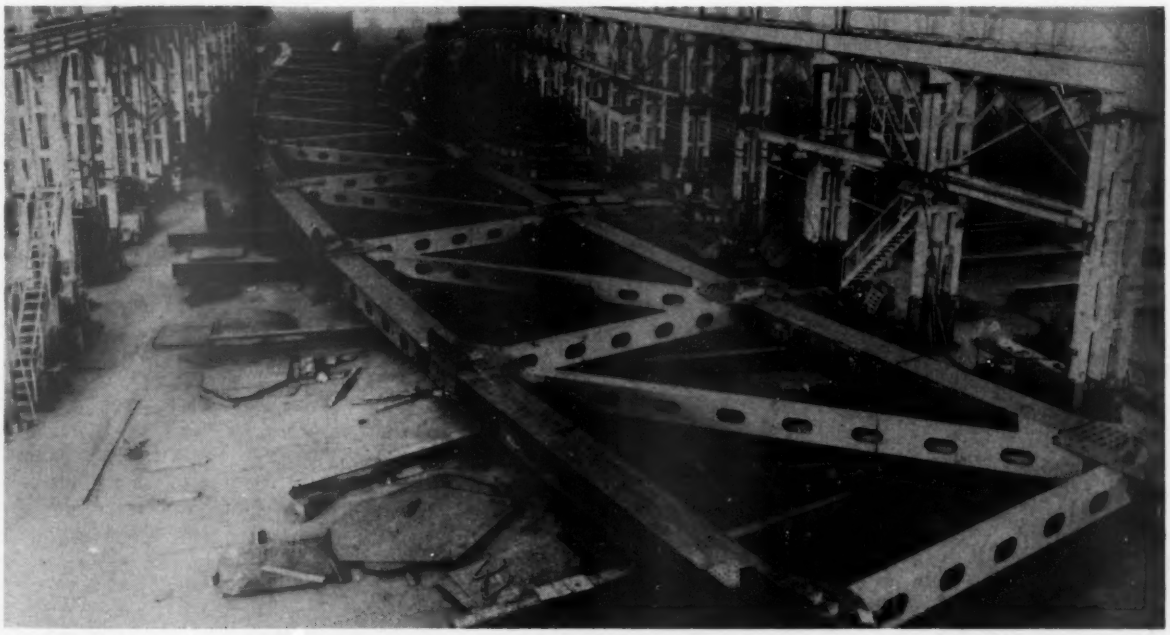


The 1600′ New Albany Bridge spanning the Ohio River between Indiana and Kentucky is using welded fabrication for the major components, and high strength structural bolting for the final field assembly. The superstructure of the bridge is being fabricated by the R. C. Mahon Company of Detroit, and marks the initial use of 100,000 psi yield strength steel for bridge construction.

Another innovation in the fabrication of the structural components is the use of a numerically

continued

Artist's sketch (above) of 1600′ double-tiered tied arch bridge spanning Ohio River. Bridge truss (below), being assembled at Mahon plant.



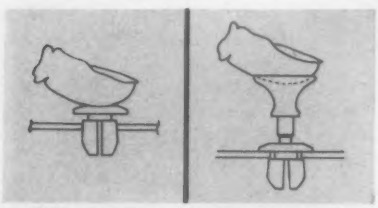
introducing

NYLATCH®

Nylatch, a new push-pull fastener, is now offered off the shelf to industry needing the ultimate in dependable low cost fastening.

Nylatch will replace most existing fasteners for metal, wood and synthetics yet gives these outstanding features—

- Less than 10 seconds installation—merely insert grommet into material to be fastened and insert plunger in grommet.
- Standard punched or drilled holes accommodate Nylatch.
- Nylatch allows up to .040 misalignment tolerance.
- Rugged two-piece construction gives 30,000 complete cycles of operation. Thoroughly tested for temperature, creep characteristics, fatigue and load.
- Versatility of design allows you a selection of plunger head designs. Available in wide range of decorator colors.



Press grommet into removable sheet

Press plunger into installed grommet

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controlled automatic drilling machine designed by Walter P. Hill, Inc.

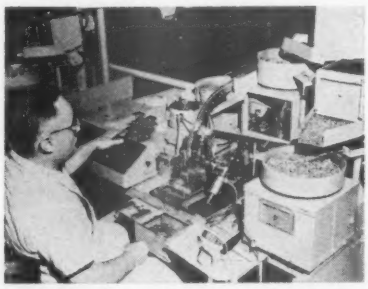
Replacing previous methods of radial drilling and various other methods of punching, the tape controlled machine automatically drills the necessary holes, eliminating costly reaming operations on detail plates, and hole pattern layout operations.

In the design of the double-level, tied arch bridge, computers were used to determine initial and secondary stresses and deflections in the steel structural members.

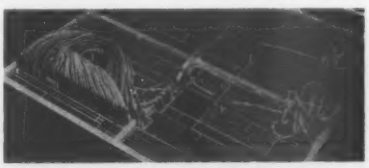
PLUG NOSE ENABLES AUTOMATIC ASSEMBLY OF IBM UNITS

To achieve dependable performance, low unit cost, and automatic assembly, a plug nose used in IBM programming boards for data processing machines had been redesigned. Developed to insure circuit contact, these special patch cord plugs are inserted in varying patterns into interchangeable program boards.

With the previously used plug nose stamping, the action of the assembly was not reliable. Positive seating or release of the plug nose was uncertain, since such action depended on the spring characteristic of the tiny lip that protruded from the stamping. Either it protruded too far, causing the nose to jam in its retaining sleeve, or it lost its spring action and "flattened", resulting in a loose fit which permitted the plug to be pushed out accidentally during handling or storage of the wired program boards.



Automatic plug assembly machine has vibrating hopper feeding four components and lines them up for assembly at rate of 140 per minute.



Die cast plug nose in use on IBM computer board. Design of plug prevents accidental disconnect of program circuits.

By redesigning the plug nose for automatic die casting, IBM was able to take full advantage of automatic assembly of the patch cord plugs. First the plug nose and then the entire program wire are automatically assembled by two special machines developed by IBM engineers.

The plugs were developed by IBM in conjunction with engineers of the Gries Reproducer Corp., and utilize a ball-detent design to achieve positive locking action. It consists of a four-part assembly; the zinc-alloy die cast plug nose, a coiled spring, a ball and a steel sleeve.

TRANSISTOR MOUNTING BASE ACTS AS CONDUCTOR, HEAT SINK

The use of two alloys, oxygen-free copper and zirconium-copper alloy, makes up a family of improved copper semiconductor mounting bases. These bases double as both an electrically conducting mount and heat sink for transistors, rectifiers, and other semiconductors.

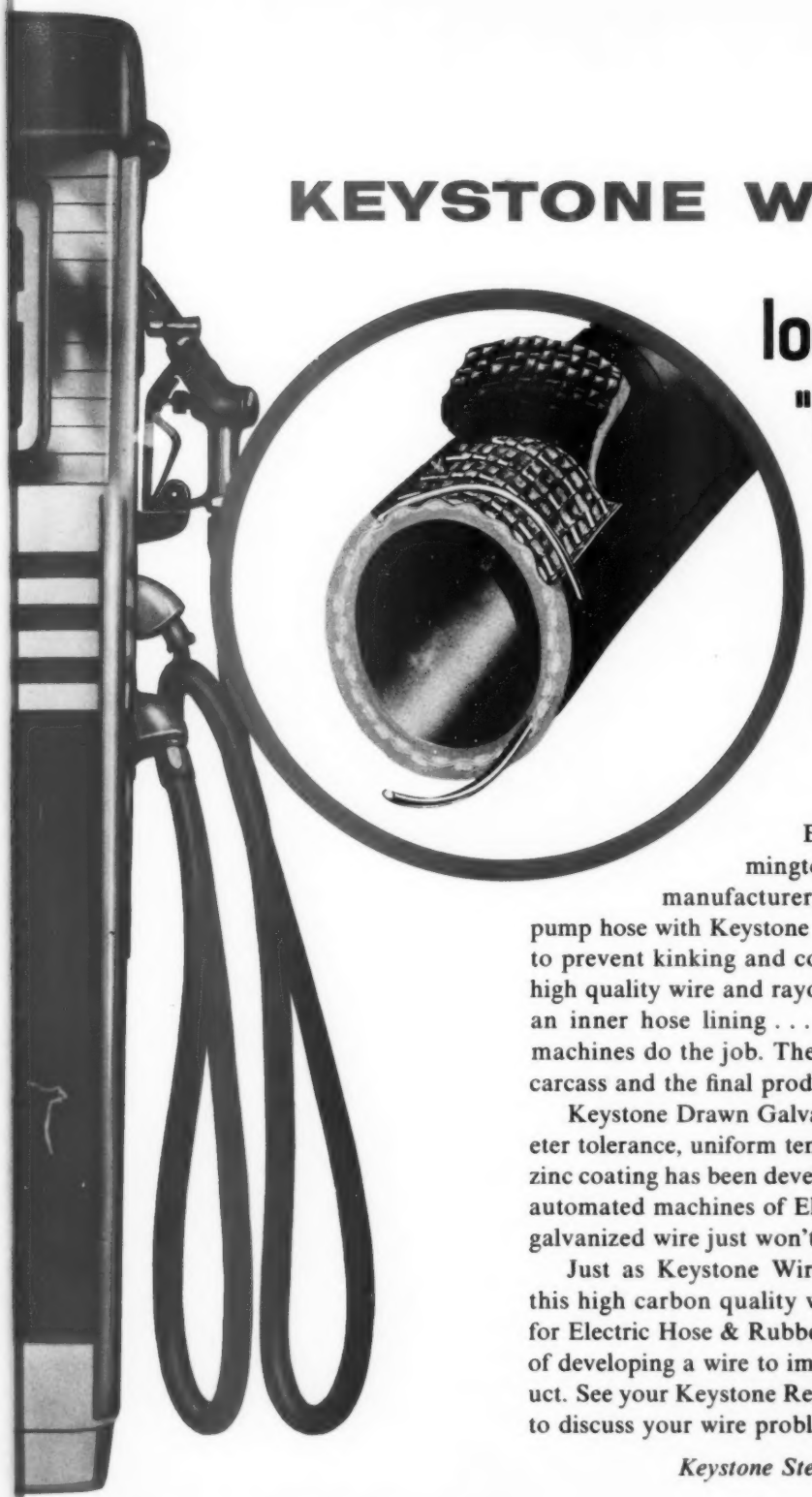
The line, developed by Standard Pressed Steel Co., was made practical by means of a cold forming technique, which gives much closer dimensional control than the traditional machining with resulting operational advantages for the user.

The oxygen-free, cold forged copper bases provides as much as 10% more electrical and thermal conductivity than the commonly used tellurium copper.

Use of the other copper alloy, a zirconium-copper containing 0.15 zirconium, produces a high-strength

continued

KEYSTONE WIRE...



long life "backbone" for gasoline hose...

Electric Hose & Rubber Co., Wilmington, Delaware, world's largest hose manufacturer, reinforces their Delmar gasoline pump hose with Keystone Drawn Galvanized MB Spring Wire to prevent kinking and collapse and to resist corrosion. This high quality wire and rayon cord are circularly woven around an inner hose lining . . . automatic horizontal woven hose machines do the job. The outside cover is extruded over the carcass and the final product vulcanized.

Keystone Drawn Galvanized MB Wire with its close diameter tolerance, uniform temper throughout the coil and special zinc coating has been developed to work perfectly in the highly automated machines of Electric Hose & Rubber Co. Regular galvanized wire just won't work.

Just as Keystone Wire Specialists successfully produced this high carbon quality wire that has proved so satisfactory for Electric Hose & Rubber Co., they would like the challenge of developing a wire to improve upon your present wire product. See your Keystone Representative soon; he will be pleased to discuss your wire problems.

Keystone Steel & Wire Company, Peoria, Illinois

KEYSTONE

WIRE FOR INDUSTRY

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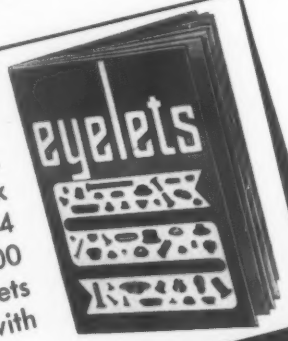
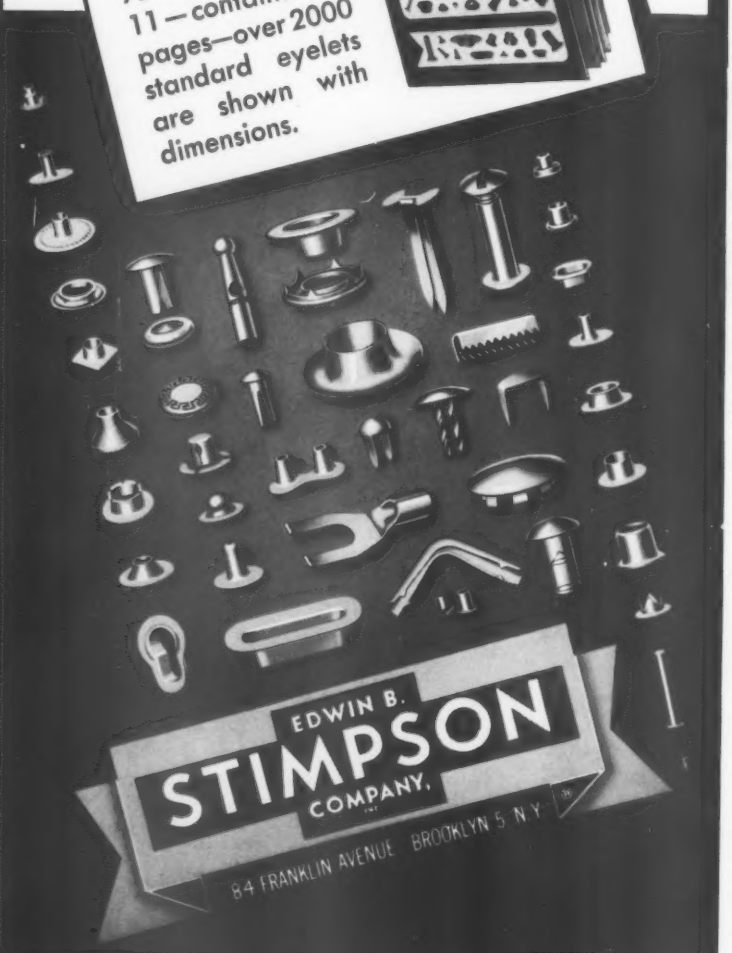
You will find us prepared to supply a type of fastener that is exactly suited to your specific requirements. If you use split rivets, tubular rivets, side-prong rivets, eyelets, washers, grommets, snap fasteners, or any other similar metal article—write for samples and prices—today.

Send for your copy of this valuable free book. Actual size 8½ x 11—contains 104 pages—over 2000 standard eyelets are shown with dimensions.





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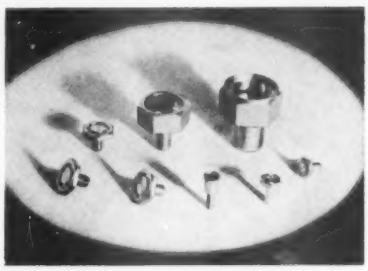


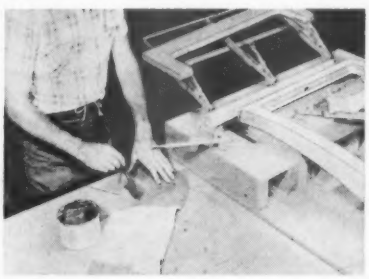
Cold formed semiconductor mounts made from copper alloys, double as heat-sink and electrically conducting mounts.

series of bases, which retain high strengths even after exposures to temperatures of 1000° F. The zirconium-copper alloy also produces parts with much greater torque-strength ratings.

The basic economy of the cold forming process in substantial runs offsets the added cost of both the higher-priced zirconium and oxygen-free materials and of strict quality control checks, permitting the sale of the improved product at prices comparable to machined, tellurium copper bases.

ADHESIVE SPEEDS AIRCRAFT SEAT ASSEMBLY

The development of production line techniques for airline passenger seat production required the use of an adhesive whose properties would permit instantaneous bonding of full top grain leather and plastic padding to the contoured aluminum framework.



Applying adhesive to leather prior to bonding to contoured aluminum back frame.

The sculptured, deep cushioned and contoured seat was designed for use in the Boeing 720 jetliner by the Aerotherm Division of Aerotec Industries, Inc.

continued

Setko's 23 Years of Progressive Engineering Experience Keeps Screws Modern as Tomorrow's Products

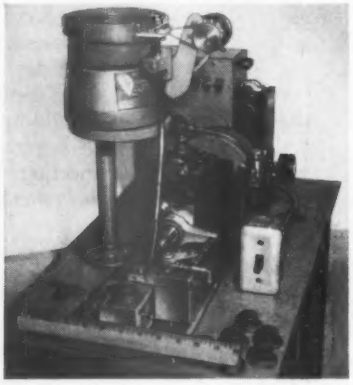
SETKO NEWS

We Specialize in Solving Puzzling Screw Problems

Vol. 3, Issue No. 1 | Bartlett, Illinois (Chicago Suburb) | Progress Edition

NEW HOPPER FEEDER QUADRUPLES SET SCREW INSERTION RATES

Labor costs cut by 75%



Changeover from manual to automatic insertion of set screws is now easier and more profitable than ever. More profitable because this new, compact, Setko Hopper Feeder requires less space — and embodies advancements and refinements in design to make for greater operating efficiencies. It is now possible to actually quadruple insertion rates over the hand method, while cutting labor costs by 75%.

Operation of the machine is less complicated than the hand method. All the operator has to do is feed the workpiece to the receiving pad and the machine automatically drives the screw to a predetermined depth. Every screw is uniformly inserted.

Additional savings result from a reduction in rejects and floor loss. Users report "rejects have been cut to almost zero and floor loss has been eliminated!"

More than fifteen years of experience in the design, engineering and manufacture of Hopper Feeders is behind the cost-cutting, production-increasing performance of this new model.

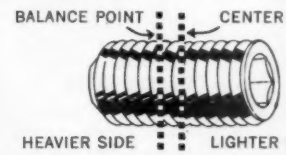
Feeds any type of headless set screw and with any point style

Hex Socket, Fluted Socket, Slotted or Slabbed heads and with any type point, can all be oriented and fed with equal efficiency. Even "specials" can be oriented in most cases.

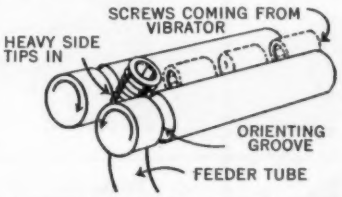
760R

Exclusive orienting mechanism assures perfect positioning of screw every time

It's really a matter of balance... Every type of set screw has a point of balance. Because of the manufacturing methods used it is almost never exact center. This means that from the center of the screw, one end is a little heavier. The object is to get the heavier end to tip *consistently*



into the feeder tube. Setko accomplishes this by feeding the screws from the vibrator to the orienting mechanism *where it is literally wafted* on a cushion of friction between two opposingly driven rollers.

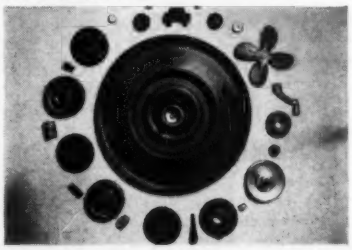


A groove in each roller acts as a balancing point so that no matter which way the screw approaches, head first or point first, the heavier end tips into the groove and falls into the feeder tube.

Many Models Available

In addition to the air-operated table top model shown on this page, Setko has a complete line of Hopper Feeders for use with vertical drill presses, etc. Various type driving and feeding mechanisms are available to assure the right combination for your operation.

Used on a Wide Variety of Products



Automated insertion of set screws is performed on these and many more products. The workpiece is simply fed to the receiving pad and the set screw is driven to a predetermined depth. In most cases the final tightening of the set screw takes place when the component is assembled to the main product. In some cases, the final inserting and tightening take place at one time.

Pays for itself in less than a year

Companies who have bought and are using Setko Hopper Feeders say that, "they pay for themselves in less than a year." In many cases, "much less than a year."

Send the Coupon Today for Full Information

Send your specifications for recommendations and quotations.

SETKO Set Screw & Mfg. Co.
705 Main Street, Bartlett, Illinois

☐ Send me complete information on your Hopper Feeding Method.

☐ I am attaching specifications. Please send recommendations and quotations at no charge.

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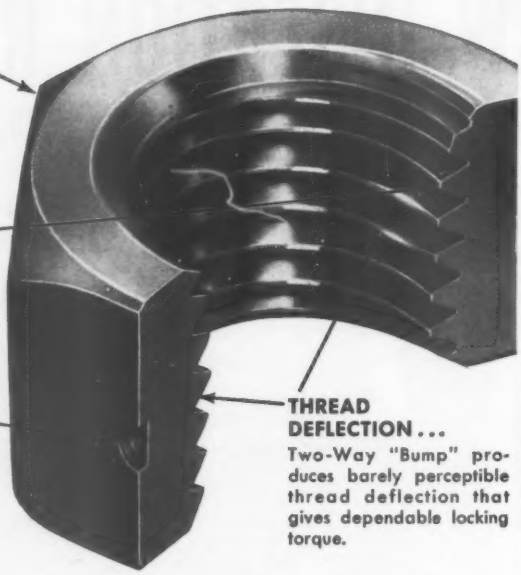
reveals why it can improve your product and simplify fastening

DOUBLE CHAMFER...
The Two-Way is always right side up. Ideal for hand or hopper feed.

THREAD PROFILE...
More care in tapping produces threads that far exceed industry's minimal standards.

THE "BUMP"...
Puts the lock in the *center of the nut*. Does not affect top and bottom threads—permits easy starts. Allows bolt end to be flush with, or below, top of nut.



THREAD DEFLECTION...
Two-Way "Bump" produces barely perceptible thread deflection that gives dependable locking torque.

MF TWO-WAY LOCK NUTS AVAILABLE AS:

HEX NUTS

Sizes: No. 6 thru 1¼"

FLANGE NUTS, All Sizes

OPEN END CAP NUTS

Write for MacLean-Fogg CATALOG —or see it in Sweet's

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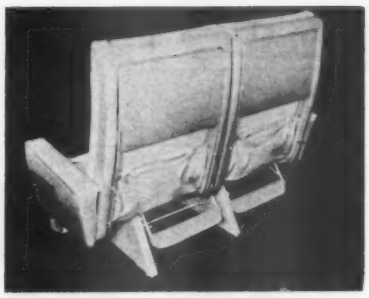


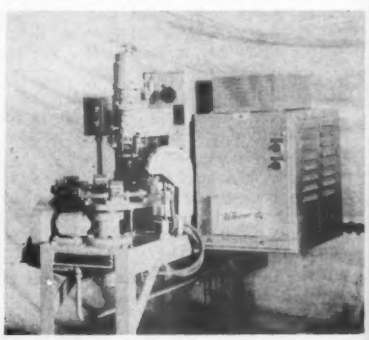
Airliner seat has top grain leather bonded to contoured back frame. Leather and plastic foam padding are also bonded to side panels and back frame.

After extensive testing, Aerotherm selected a high strength, general purpose, contact bond type adhesive, made by Minnesota Mining and Manufacturing Co. The contact bond adhesive combines the required strength build-up and high adhesion to both porous and non-porous surfaces meeting Aerotherm's production line standards.

DIAL TABLES ACCENT HIGH-SPEED WELDING

The high-speed welding of parts in two separate production assemblies has been facilitated through the use of dial feed tables, and projection welding machines made by Thomson Electric Welder Co.

In a bench mounted installation, a manually loaded table is motivated by a pneumatic system and sequenced through cams, solenoids and time delay switches. Each station rotates to the welding unit,



Geneva dial table used to speed electrical contact assembly.

where the welding cycle is triggered automatically when the parts are properly aligned under the electrode.

A second machine, with a

continued

INDUSTRIAL RETAINING RING PRICES REDUCED UP TO 51%

Series 1000, Series 3000 and Series 3100 Industrial Retaining Ring prices—in quantities up to 100,000—have been greatly reduced.

Thanks to modern, efficient production methods you can now get these Industrial Retaining Rings—either pre-stacked or bulk packed—at new, low prices . . . and pay less for pre-stacked rings than you have been paying for bulk packed. Reductions apply to standard materials and finishes.

Use this coupon to send for your new, revised IRR Price List.

INDUSTRIAL RETAINING RING COMPANY

Please send me, free, a copy of the new 1961 IRR Price List—61A.

_____I would also like to have your representative call.

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SOCKET SCREWS

LED-LOK is the perfect seal for hydraulic applications as well as air and any type gas. It's designed to give good results in minor vibration problems. Screw is pre-assembled and available in all standard socket screw sizes.

SAF-LOK is the answer to severe vibration problems requiring high torque. It's available in a choice of locking inserts—brass, bronze, aluminum or stainless steel capable of withstanding high operating temperatures.

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Geneva dial table is integrated into the welding operation to better the assembly time for electrical contacts and holders. The sequence is established by clamps and an indexing mechanism. The speed of the table is adjustable and automatic air ejection at the last station is provided.

Controls in the circuitry include a safety device mounted on the head to prevent the welding circuit from closing if the work is not on the station.

PLIER APPLIES REPEATED PRE-DETERMINED PRESSURE

An industrial plier which permits the time-after-time application of a pre-determined clamping force, regardless of the thickness of the work held has a 1200 lb maximum clamping force.

Heart of the Lapeer plier is a "load indicating washer." In use, the adjusting spindle is set for the desired clamping force by trial clamping. When the right holding force is determined, the self-locking nut on the plier anvil is then adjusted so that the "load indicating washer" moves smoothly with the plier clamped on the work.

To duplicate an established clamping force on any other work thickness, it is only necessary to turn the adjusting spindle so that the "washer" again moves smoothly after clamping.

CERAMICS IMPROVES GLASS-TO-METAL SEAL PROCESS

Savings in tooling costs as high as 40% in glass-to-metal sealing processes have been effected through the use of a ceramic mold manufactured by Duramic Products Inc.

In the past, the only available mold material resisting wetting by molten glass during the seal operation at 1000° C, was carbon or

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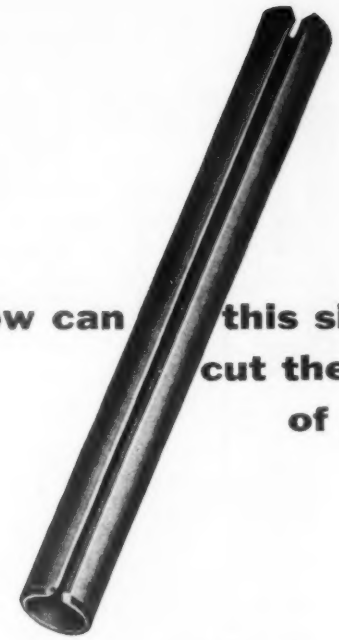

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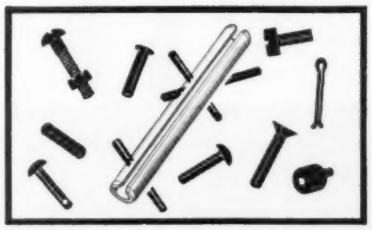
Rollpin aids standardization and reduces inventory

Rollpin readily replaces taper pins, grooved pins, straight pins and set screws; it can be used as a locating dowel, hinge pin, cotter pin, stop pin or, in some applications, even as a rivet. Thus, when you standardize on a Rollpin you can drastically reduce the variety of fasteners in your inventory—save money in purchasing, storage space and stock handling.



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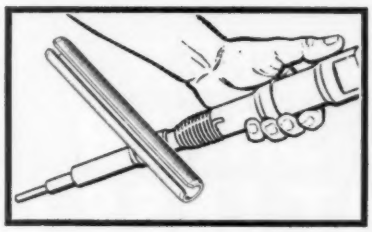
When you use Rollpin you can eliminate costly precision drilling, or tapping operations. And there's no need for any secondary locking operation—such as lock wiring or peening. That's because Rollpin is a slotted tubular steel spring whose chamfered ends drive easily into standard production-drilled holes, compressing as driven. The spring tension against the hole walls retains Rollpins securely against severe vibration. Independent studies have shown that installed costs of Rollpin are as much as *91% less* than those for a dowel pin or *95% less* than the installed cost of a taper pin.



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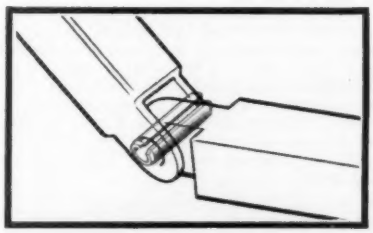

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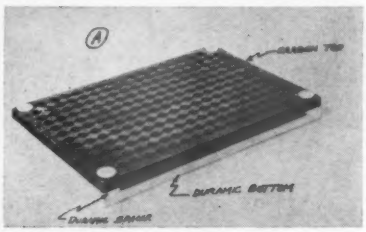


Typical glass-to-metal seal mold assembly, using Duramic mold.

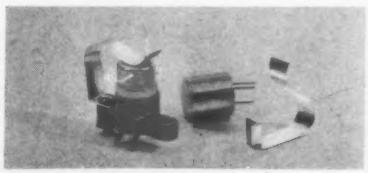
graphite. These materials are relatively soft and do not hold tolerances for long periods, and in the slightly oxidizing temperature the carbon also creates its own reducing atmosphere, which tends to rob oxide from the oxidized metal header cups, thereby impairing the ability of the glass to wet the metal and reduces the leak-proof yield.

Designed to replace carbon or graphite, the ceramic material does not oxidize or change size at the 1000° C temperature, and it allows the production of a high-strength, leak-proof seal.

A special design of the mold cavities eliminate the adhering of the molten glass to the mold.

SPRING CLIPS HOLD SOCKET MOUNTED TRANSISTORS

Two retaining clips for socket mounted TO-5 and TO-9 series transistors comply with military requirements for retention of plug-in devices. The spring clips, designed by the Birtcher Corp., provide a positive spring pressure retention on the transistor case top and easy access for service. Mounting is accomplished by means of the screw or rivet which attaches the transistor socket to the chassis. A locking tab on the clip positions it and prevents twisting.



Readily mounted spring clip holds transistors tightly in place.

The clips can also be used in applications where heat removal is required, in combination with transistor radiator devices. •

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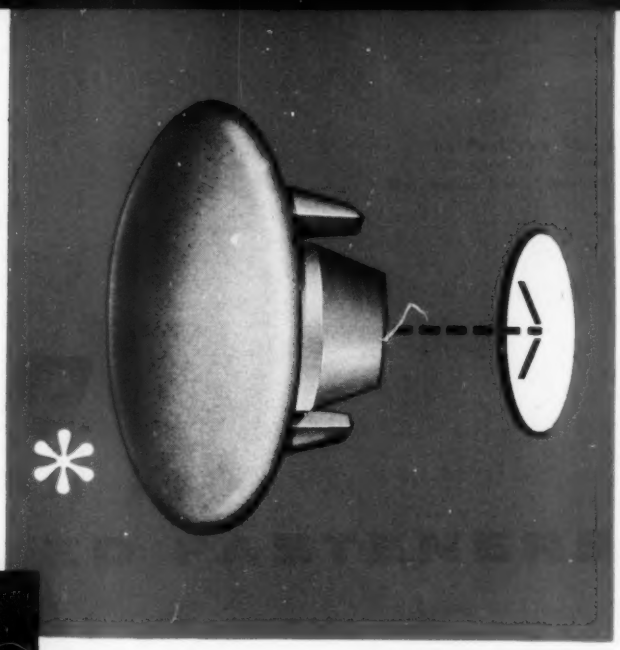

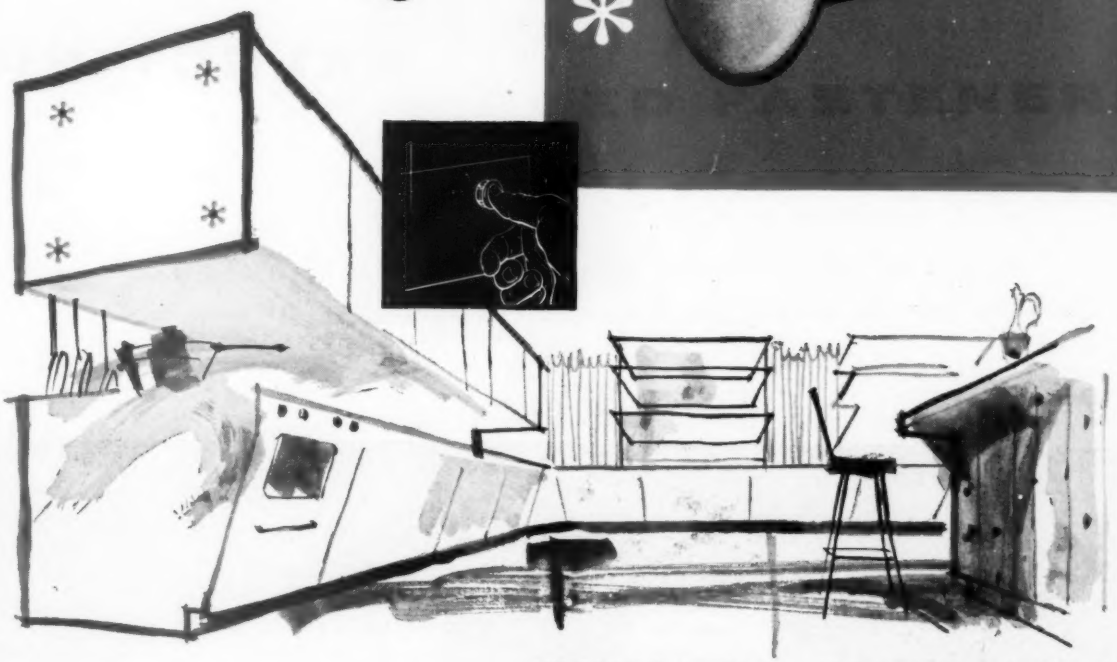

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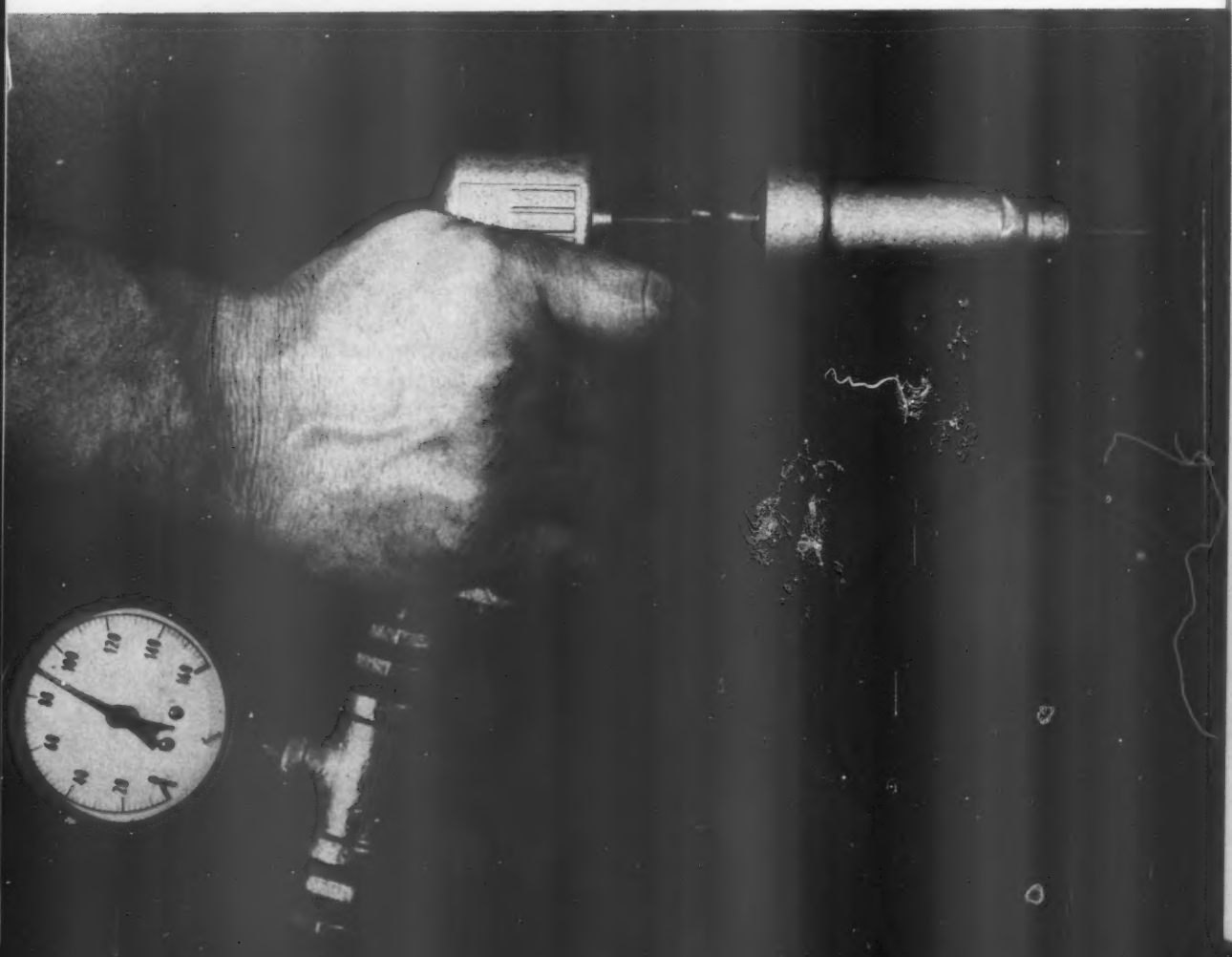
SELECTING



by **Paul Van Sittert**
Director of Resarch
The Rotor Tool Company

POWER DRIVERS FOR THREADED FASTENERS

This first of two articles discusses yardsticks for selecting power drivers. Next month the author further discusses clutches and typical air tool applications.

The use of threaded fasteners continues to increase along with significant improvements in adhesives, widespread use of printed circuits in electrical devices, all kinds of unthreaded fasteners such as rivets, clips, wire and sheet-metal fasteners, plus an ingenious array of crimping, lancing and staking methods used also for assembly.

The family of standard and special threaded fasteners has likewise grown to keep pace with the assembly needs of industry. Considerable standardization work has been completed by the fastener manufacturer and a number of improvements have been inaugurated. A whole new series of high strength bolts have been developed to meet the exacting needs of the construction industry. Another series aims at improving the relationship between head proportions and shank proportions with a corresponding increase in the holding power. A variety of shanks and points has been evolved for self-tapping and sheet metal applications. The wrenching arrangement has received considerable attention so that several alternatives are now available from which to select the head best suited to a particular application.

With a wide variety of products to be assembled and such an assortment of sizes and types of fasteners with which to assemble them, it is no wonder that some confusion may exist in the mind of the engineer when he has to select an appropriate tool for driving a specific fastener in a specific job. The group of tools available for driving threaded fasteners has grown in much the same ways as the products to be assembled and the supply of fasteners with which to attach them.

There is some overlapping not only in capacity of tools, but also in the type of driver, so that in many instances a particular fastener might be successfully driven with any one of several types of tools. On the other hand, there are certain basic requirements affecting quality or economy or both, which dictate that a specific size or type of tool is preferable for a certain application. Large savings in assembly costs are often possible by selecting the best driver, so that better tools pay for themselves. Let us now examine some of these requirements, to see how they influence our selection of an appropriate tool for driving a specific fastener in a certain assembly.

Fig. 1: Air pressure at tool can be checked by using air-line kit which includes tee gauge as shown at left.

SIZE OF FASTENER

Our first rough yard stick for dividing assemblies, the fasteners for attaching them and the proper tools for driving them, into appropriate groups is the nominal diameter of the fastener. For this rough classification we will divide all fasteners into three groups. In this first group which we will call small fasteners we will include all types of shanks and points as well as all styles of heads on the threaded fasteners. We will arbitrarily select 1/4" nominal shank diameter as the upper limit of this group. The fasteners comprising this group are tightened almost universally by power tools which we can refer to under the generic title of screwdrivers.

These tools embody either an air or electric motor, a gear train to yield satisfactory spindle speed, sometimes a clutch mechanism, plus suitable fittings and adapters to couple the drive to the fastener. The motors may be reversible if it is necessary to loosen or remove cer-

continued

tain fasteners at some point in the assembly process. It should be remembered that reversible motors are slightly higher in price than non-reversible motors, and they are also somewhat higher in maintenance. Reversible air motors are also inclined to be less efficient, noisier and possibly less powerful than non-reversible air motors. (Clutch mechanisms as well as fittings and accessories will be discussed later.)

The general shape of the tool and the location and type of trigger depend primarily on the assembly location. If the fasteners are to be driven vertically to a plane surface assembly, a cylindrical shaped tool is frequently suspended from a spring or balancer so that it can be pulled down onto the fastener by the operator as each unit is driven—such as might be the case where groups of components are passing along on a conveyor in an assembly line. Where the operator must drive fasteners at various locations and positions, a pistol grip shape is often preferred.

For the limits of our second group of fasteners, which we will call the medium-sized ones, we will arbitrarily choose the range of nominal diameter from 1/4″ to 5/8″. Again we will include all types of heads, shanks and points. The tools used for driving the fasteners in this group may be somewhat more diverse than those used for driving small fasteners. Some drivers are similar to the screwdrivers used on the first group, except that these tools are somewhat larger and more powerful. They may be equipped with dead handles for two-hand operation and may be used with or without clutches. With this group there is some use of stall-type air motors arranged with right angle drives. Though the right angle drive is not always necessary from the standpoint of accessibility, such a configuration in the tool provides the operator with a greater leverage with which to resist the torque reaction when the tool stalls. The third type of tool used in driving fastenings in this group is the impact wrench.

Our final group of fasteners, in which we will arbitrarily include those 5/8″ nominal diameter and larger, we will call large fasteners. Practically all of the fasteners in this group can best be driven by means of impact wrenches.

Three observations should be noted in conjunction with our classification of drivers according to size of the fastener being driven. The first such item is the danger of overtightening certain fasteners, especially those in our first group of small fasteners. Excessive tightening may twist off the fastener or strip out the threads in the work with consequent necessity of salvage and re-work or scrap.

The second item to consider is that where stall-type air motors are employed, the operator must absorb the entire torque reaction when the motor stalls. This feature is objectionable when the torque is considerable. It can even be hazardous if the operator is unprepared for the reaction when it comes.

The third item to consider is that in some applications the operation can best be performed by tightening several fasteners simultaneously through the use of multiple tooling. Such an arrangement has the advantage of eliminating the torque reaction of stall motors in addition to the economy of multiple driving. It also provides an opportunity for practical solution of difficult problems such as gasketed jobs. In such cases the torque on the first fastener to tighten in a given assembly continues to be applied until the last fastener in the assembly is fully tightened. In this way uniform tightness of all of the fastenings can be attained in spite of the yielding of the gasket during the tightening process. Disadvantages of multiple tooling lie chiefly in higher cost of tooling (since each multiple fixture must be designed for its specific application) and for lack of flexibility and versatility in the event of design changes or changes in processing.

MOTOR TORQUE NEEDED

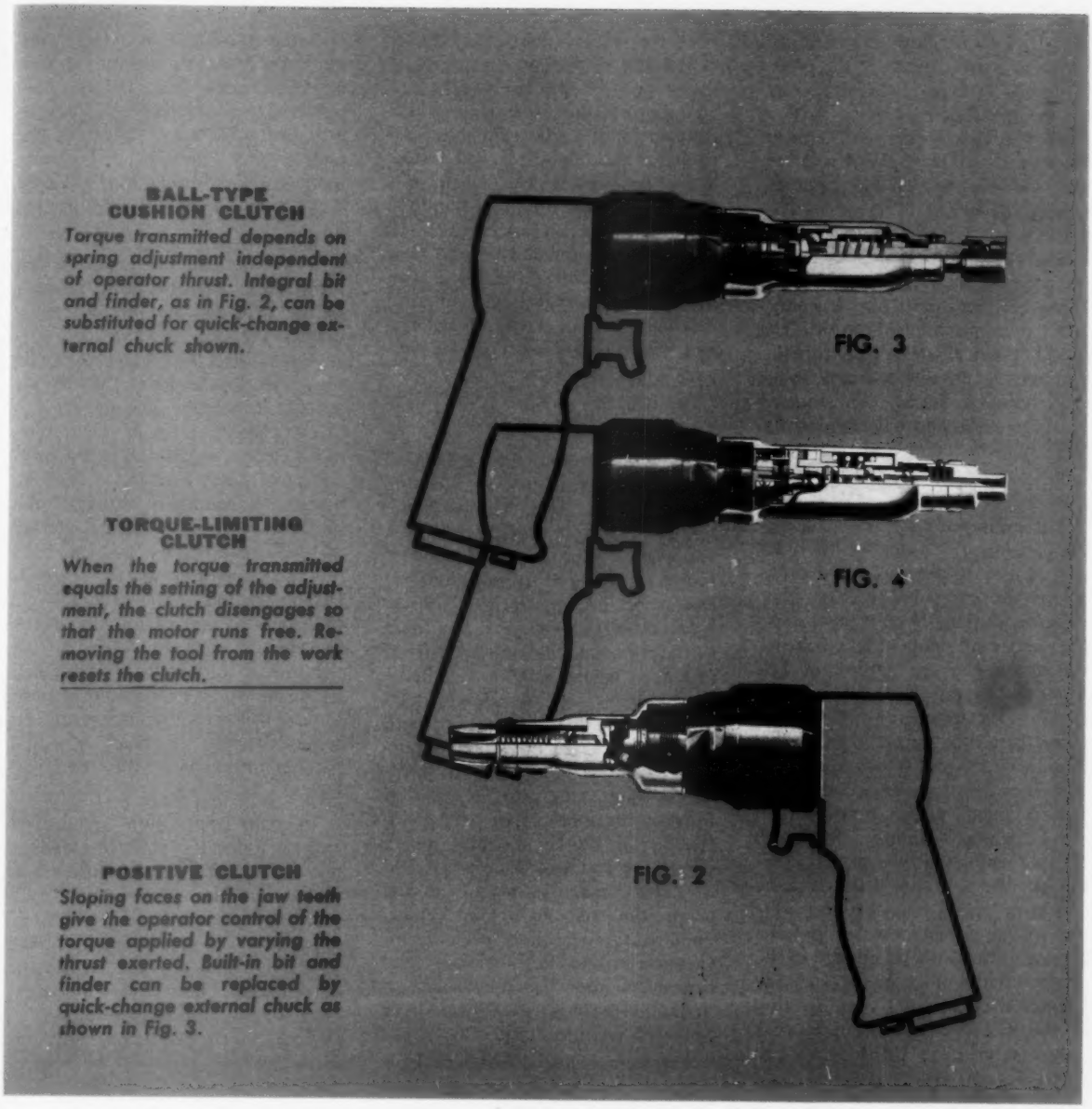
Now that we have a rough idea as to what type of driver to use according to the nominal diameter of the fastener we proceed to the application of our second yardstick, which is to match the torque desired in the fastener with the torque available from the driver.

It is obvious that the motor at stall must be able to deliver at least as much torque as the fastener requires unless we are to rely upon impacting to make up the difference. It is equally obvious that if impacting is used, the tightness of the fastener will depend upon how long the impacting continues.

In any event, our first step is to evaluate the torque required by the fastener if this figure has not yet been established. For purposes of selecting the driving tool, we should estimate the torque requirement of the fasteners on the high side. For our rough estimate we can safely use a figure of 60,000 lbs. psi stress based on the nominal fastener diameter. For soft steel fasteners or for brass fasteners, a figure of about 1/3 or 1/2 of this value might be more appropriate. However, our aim here is to obtain a conservative guess about the torque required of the motor. We can estimate the tension needed in the fastener by multiplying our 60,000 lb. stress by 3/4 of the square of the nominal fastener diameter. For example, if the nominal diameter were 1/4″, the square of the nominal diameter would be 1/16″, and 3/4 of this figure would be 3/64th square inches approximate area. Multiplying by the 60,000 would yield about 2810 pounds tension.

To estimate the torque requirement we will use the simple approximation that the inch-pounds torque is equal to 1/5 the fastener tension times the nominal fastener diameter. Continuing our example of a 1/4″ fastener we would find that the inch-pounds torque would be 2810 x 1/4 x 1/5, or 140 inch-pounds. If we prefer to express the torque in foot-pounds we can divide by 12 to obtain 11.7. Thus the motor must be able to deliver a maximum of 12 foot-pounds torque to our 1/4″ fastener at some portion of the tightening cycle unless we are to rely on impacting to complete the tightening.

The torque which the motor is able to deliver to the fastener is largely dependent on the gear ratio. If the same motor is furnished by a manufacturer with two different gear trains, one of which has an idle speed of 2000 rpm, and the other an idle speed of 1000 rpm, the 1000 rpm tool is likely to have almost but not quite twice the available torque of the 2000 rpm tool. There will be some frictional loss resulting from the extra gearing. Thus the


BALL-TYPE CUSHION CLUTCH
Torque transmitted depends on spring adjustment independent of operator thrust. Integral bit and finder, as in Fig. 2, can be substituted for quick-change external chuck shown.
FIG. 3
TORQUE-LIMITING CLUTCH
When the torque transmitted equals the setting of the adjustment, the clutch disengages so that the motor runs free. Removing the tool from the work resets the clutch.
FIG. 4
POSITIVE CLUTCH
Sloping faces on the jaw teeth give the operator control of the torque applied by varying the thrust exerted. Built-in bit and finder can be replaced by quick-change external chuck as shown in Fig. 3.
FIG. 2

Note: The positive clutch is discussed on the next page. The other two clutches will be discussed in Part 2.

action of the gear train serves to magnify the torque which the motor alone could produce.

Many tools are equipped with a speed regulator. This device serves to reduce the speed of the motor from its maximum to some lower speed which may be desired. In an air motor the regulator reduces the pressure reaching the motor so that the torque and horsepower output of the motor is reduced at the same time that its speed is diminished. The effect is the same as would be produced by using a rheostat to reduce the speed of a universal electric motor.

The amount of torque which any motor acting through its gear train can deliver to the fastener can be obtained from the motor manufacturer. Information concerning torque can be estimated from catalog capacities, but these capacities for air motors are usually based on a full pressure at the tool of 90 lbs psi. If the air pressure in the plant is some smaller value at the tool because of undersized fittings, long hoses, inadequate compressor capacity, or improper piping, the available torque will be approximately proportional to the actual pressure. The user should strive to keep the pressure at the tool as near as 90 lbs psi as possible, and reasonably uniform to obtain best performance from his tools. Air pressure at the tool can be checked easily by using an air line kit which includes a tee gauge as shown in Fig. 1.

We have mentioned briefly that

continued

impact could be used to amplify torque. Let us now examine this situation more closely. If the power of the motor is permitted to accelerate the speed of its moving parts at small load for a period of time or through a certain angle of rotation, then the work which has been expended is stored in these moving parts in the form of kinetic energy. Resistance applied so as to reduce the speed of these moving parts will reconvert the stored kinetic energy back into mechanical work. The ratio between the time of accumulation and the time of delivery, or the ratio between the angular distance of accumulation to the angular distance of delivery, is an index of the torque amplification which can be expected.

For example, suppose that a motor capable of producing 10 ft/lbs of torque were permitted to accelerate its moving parts for one complete revolution. Then if these moving parts were coupled to a fastener which arrested the motion in 1/4 turn, the average torque force exerted on the fastener would be four times the motor torque or 40 ft/lbs. Ordinarily the motor torque changes with speed so that the actual operation is much more complex than our elementary example, but it will help us understand the principle involved. We note that if the advance of the fastener is smaller, the average torque force increases proportionately, but with no change in the characteristics of the motor. In many impact wrenches the amplification of the motor torque often reaches values as great as 100 to 1.

The momentary storing and subsequent delivering of energy is by no means limited to impact wrenches. If we couple a direct drive motor to a free-running nut which tightens abruptly, we find that the torque force applied to the nut is considerably greater than the torque capacity of the motor because of the stored momentum of the moving motor parts. In this case we have the effect of a large single impact. A parallel condition exists with the application of certain clutch type tools, as we shall see a little later.

In their efforts to speed up the assembly process, manufacturers of most impact wrenches, especially in the smaller sizes, have increased the power output considerably beyond the requirements of a fastener of the size of the rated capacity of the wrench. Some users take advantage of this fact to tighten fasteners larger than the rated capacity of the impact wrench. There are undoubtedly cases where this is justifiable. On the other hand the user should clearly understand that using impact wrenches beyond their rated capacity not only slows down his assembly operation, but also inevitably increases the down time and maintenance costs on his impact wrenches.

TORQUE TOLERANCE

We come now to the application of our third yardstick in selecting power drivers. This deals with the torque tolerance or permissible variation in torque of the tightened fastener compared to variations we can expect in actual practice. Some users classify their jobs according to importance. Extremely critical fasteners, where a failure might be a matter of life or death, may necessitate 100% inspection with hand torque wrenches and a possible tolerance of $\pm$ 5% from specified torque values. In less critical fastener locations spot check inspection might be adequate and a power driver selected so as to yield a $\pm$ 10% range of torque around a specified value. On least critical applications infrequent periodic inspection would be sufficient, and drivers would be relied on to maintain the torque within larger limits of possibly 15 to 20%.

Different types of fasteners have different torque requirements during the run down portion of their tightening cycle. Bolts or screws with nuts or tapped holes turn quite freely until final tightening begins. Wood screws and lag screws ordinarily increase progressively in resistance as the fastener is driven. Sheet metal screws may behave like wood screws or they may require considerable torque until they have cut their way through the sheets, and then run with reduced torque until the head seats. Self-tapping screws may drive with nearly uniform torque through thick sections until final tightening begins, or they may diminish in resistance after cutting the thread through thinner material. The torque needed just before final tightening begins is now of interest because it affects running speed at this instant. A high running speed just before final tightening could cause less dissipation of the flywheel effect of the motor, and thereby introduce momentum factors which might cause considerable variation in final torque.

If the tapping or break-through torque of a self-threading fastener should exceed the desired final torque, the only way we can successfully drive the fastener is to let the operator control the torque applied during the driving. This is usually done through a sloping tooth clutch, usually termed a positive clutch (see Fig. 2), so that the torque transmitted through the clutch depends on the thrust exerted by the operator. By pushing hard on the tool during the thread-cutting portion of the driving cycle the operator can permit the motor to generate sufficient torque to cut the thread through the work, then by easing up on the amount of push he can allow the clutch teeth to separate when the head is seated without exceeding the desired torque.

In many applications of air and electric tools, the positive clutch is allowed to slip after the fastener is seated, producing impacts at each re-engagement, effecting considerable torque multiplication. We should not underestimate the factor of operator skill. Many operators, after a comparatively short training period, can produce amazingly uniform results, as proved by inspection of their work. With the positive clutch tools the skill lies in controlling the thrust accurately in relation to the timing. With other types of tools different sensing may be necessary. Impact wrench operators can sometimes tell by watching the advance of the nut socket just how tight the fastener is driven, while other operators seem able to detect this amount by judging the sound. Construction crews applying high strength bolts with impact wrenches obtain uniform tightness by watching a spot on the nut socket. One-half to three-quarter turn after solid impacting begins will yield satisfactory tightness. The amount of such advance depends on bolt length. •

Clean room for missile-guidance assembly

Designed to prevent moisture or dust particles from playing havoc with millionth-of-an-inch tolerance requirements.

by **C. P. Shelly,** Supervisor
Optical-Mechanical Precision Assembly
Nortronics Division of Northrop Corp.
Hawthorne, California

Space age technology could not exist without the modern, environment-controlled industrial cleanroom. Trying to assemble, inspect and test many space age products under ordinary factory conditions would be like trying to assemble, inspect and test a fine wrist watch in a swirling sandstorm on a desert.

Cleanrooms as industrial facilities are relatively new. Yet they have been far from static during the short tenure of their existence. What was considered a good cleanroom a decade ago would be unusable by present standards. The tolerances required in many space age parts and components have now shrunk to a point where, like the infinity of outer space, they defy comparison with conventional standards.

When you chop a thousandth of an inch into another thousand equal parts, then use one of these segments as a basis of comparison, a speck of dust assumes the proportions of a huge boulder blocking the pathway of an automobile. The expansion caused by the few degrees rise in temperature makes fitting two parts together as incongruous as trying to fit a 50-gallon drum inside a 20-gallon cask. Slight and invisible oxidation on the surface of a metallic part caused by airborne moisture, or slight absorption of airborne moisture by the insulation on a wire, will quickly destroy these millionth-of-an-inch tolerance requirements.

The purpose of the modern cleanroom intended for critical assembly operations, therefore, assumes three facets. It must provide an extreme degree of cleanliness and freedom from airborne dirt of

continued

all types; it must provide a constant room temperature; the humidity must be low enough to prevent rapid surface oxidation on the materials being worked with and low enough to minimize absorption of moisture by non-metallic materials.

When our Nortronics Division built its newest of several cleanrooms, specifications concerning the above requirements were rigid indeed. The room was intended for the assembly of astronertial instruments of star tracking navigation systems used in the USAF's "Skybolt" air-launched ballistic missile program and in other classified projects. Millionth-of-an-inch tolerances are common to these products.

ROOM SPECIFICATIONS

Specifications for the cleanroom when it was built (and these requirements have been consistently maintained since the room was placed in use) called for temperature control within ± 1° F, a constant 35% humidity level, and a maximum air dust count of 35,000 particles, of .3 micron per cubic foot. Compare this latter with the average home living room where the air dust count ranges between 4.5 and 5.5 million particles of this size per cubic foot.

The cleanroom itself covers some 9000 square feet in area, and accommodates up to 170 cleanroom employees at one time. It is a building within a building, so to speak, with its walls and ceiling independent of the roof and sidewalls of the building within which it is constructed. The walls and ceilings are of soft wall construction, completely sealed on the inside with a heavy coating of vinyl latex plastic covering. The concrete floor is covered with another heavy coating of electrically-conductive epoxy resin. This epoxy coating not only "leaks away" all static electrical charges that tend to accumulate in the room, but provides a hard, shiny surface which is easy to clean and does not contain cracks or crevices in which dust particles can accumulate. The main cleanroom itself incorporates several smaller rooms built along one side, but these rooms, used for specialized assembly and checking operations, are an integral part of the whole.

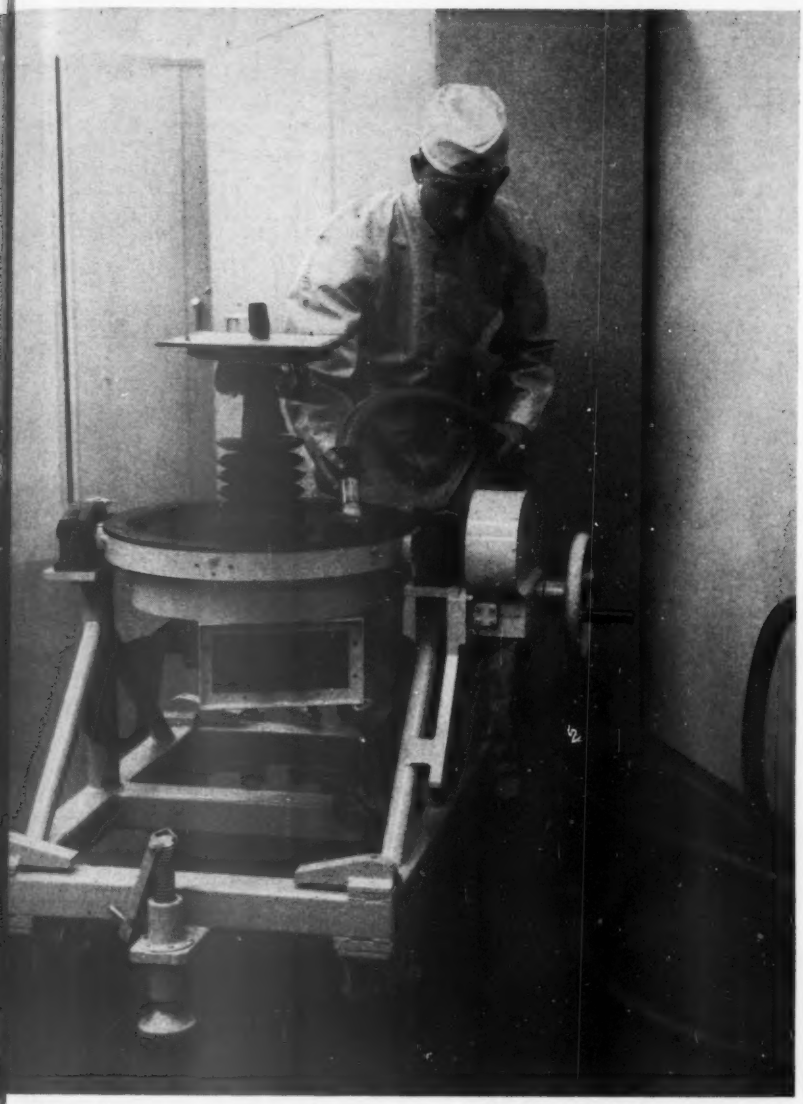
To obtain the high degree of temperature and humidity control required, the cleanroom is divided into 35 control zones areas, with each area serviced by its own incoming and return air ducts. Delicate sensing instruments located in each return air duct sense immediately the condition of the air (its temperature and humidity) being withdrawn from a specific area, and make adjustments accordingly. This multiplicity of control zones effectively eliminates any "hot" or "cold" spots within the entire cleanroom area.

It should be pointed out, however, that keeping an even cleanroom temperature and a constant humidity is relatively simple when compared with keeping the air dust count at or below the maximum of 35,000 particles per cubic foot. This is because temperature and humidity can be automatically controlled, while the air dust count is affected by the manner in which the cleanroom is operated and by the many human elements involved.

In assembling micro-precision heads for airborne computers, a vacuum line instead of compressed air is used to remove any assembly debris.

LITERALLY "A SEALED BOX"

From the structural standpoint, as already described, the cleanroom itself is literally a sealed box with no chance for airborne dirt to enter



Here a vacuum line is used to clean a large component prior to its entrance into the cleanroom. Other parts are cleaned ultrasonically.

by its own volition. All power and service line entrances into the room are sealed. Air from the temperature and humidity control air ducts is thoroughly pre-cleaned; so is the air emitted from the low pressure (15 psi) air hoses at each work bench used mainly for the quick-drying of plastics and other dryable materials used during assembly operations. Any dirt that happens to accumulate on the work during assembly (metal chips, bits of plastic, chips of wire insulation, lint, etc.) is sucked away by a vacuum line and is not blown off into the cleanroom air.

Up to this point, however, the above provisions for cleanliness are literally a part of cleanroom design and offer no special problems. Policing the cleanliness of cleanroom operation and maintenance, of parts and material entering the room, of people entering the room, and of human idiosyncrasies which may introduce cleanroom dirt, are problems of a different caliber. Here, utmost vigilance and strict regulations are required, along with any scientific or engineered devices that can aid in preventing "the carrying in of dirt."

Insofar as cleanroom operations are concerned, no operation is performed which would result in introducing airborne dust or dirt. This eliminates open grinding, polishing, or buffing. Lapping is used to obtain a tolerance or slightly reduce a dimension. No materials are permitted which would introduce harmful airborne fumes. Operations which could affect cleanroom temperature or humidity are also eliminated. Such operations must be performed before or after the part or product passes through the cleanroom area.

Routine cleanroom maintenance must be performed in a manner not to affect room cleanliness or its temperature and humidity constants. The floor is not swept; rather, it is mopped by a machine which applies detergent and water, scrubs, then vacuums up all moisture before the machine passes. Thus the floor is dry behind the machine and the water used in scrubbing has no affect on cleanroom humidity.

ALL PARTS PRE-CLEANED

Parts or materials entering the cleanroom are first pre-cleaned either by conventional means, by ultrasonics, or by a vacuuming process. Then, as the parts pass into the cleanroom, they move through a wind-tunnel like device where a generated 35 mph air stream blows off any surface dust that may have accumulated after they were cleaned.

People entering the room present the most difficult problem. Regulations require that anyone entering the room must wear a Dacron cap that completely covers the hair, Dacron coveralls, and plastic shoes. These items of clothing, in a surgically-clean condition, are donned in a locker room just prior to cleanroom entrance. Then, as the person moves from the locker room to the cleanroom doorway, he walks across rubber tack mats which effectively remove dirt from the soles of his shoes.

Entrance to the cleanroom is through a wind tunnel much similar to the tunnel used for passing in parts. The exterior door opens and the person passes into the tunnel. Here he is subjected to a 26-second, 35 mph air bath to remove all clinging dust from his garments. The inner door leading

continued

into the cleanroom proper remains locked until the air bath is completed. It then automatically unlocks and the person completes his entrance.

IDIOSYNCRASY PROBLEMS

Here is where many human idiosyncrasies enter the picture. A lady may arrive for work with a new hair-do which "just won't fit" in the confines of the Dacron cap, or she may have changed her brand of lipstick from the indelible type, or she may have forgotten and applied some powdery make-up. Men cause less trouble in this respect, though a few of them may apply a goodly coating of face powder after shaving. While such violations of regulations are largely unintentional, this does not negate the importance of policing against them, nor the dirt that will be carried into the cleanroom if they pass unnoticed.

To maintain the cleanliness required in the new Nortronics assembly cleanroom, many other factors must be taken into consideration. All hand tools must be thoroughly cleaned before they are brought into the room, and must enter through the same air bath device used for incoming parts. Most of the hand tools used are made of stainless steel, or of one of the non-ferrous alloys.

No exposed wood or paper materials are allowed in the cleanroom. While the workbenches are of wood construction, all wood surfaces are coated with a plastic sealing paint, and the benches are topped with Formica. All paperwork that enters the area (shop orders, prints, etc.) must either be inscribed on plastic paper, or the basic paper must be plastic coated. The Nortronics laboratory has developed a special acid ink for writing on these plastic materials in the cleanroom.

Some who read this article may be convinced that here at Nortronics, we are "over doing" the precautions used to maintain cleanroom cleanliness. Insofar as security permits, let us describe some of the instruments being assembled and what they will do. This will be more convincing of cleanliness requirements than actual statement of fact.

A large proportion of the parts being assembled are so small that the work must be done under a microscope. The finished part may be the size of a match head. On it may be hand-wound several coils of wire, with each wire one-fifth the diameter of a human hair. These wires may have soldered connections accomplished with a soldering iron the size of a sewing needle.

Areas on some parts must be lapped so flat that when two of these surfaces are brought together, the two parts literally become one and surface adherence occurs. This is because the surfaces are so flat that no air can get between them, and the parts are held together by normal atmospheric pressure.

One instrument being assembled, when coupled to an oscilloscope and mounted on a heavy slab steel table top four feet wide, eight feet long, and five inches thick, will measure the distortion introduced into the five inch thick steel slab by merely touching it with a finger tip. The same instrument registers normal earth vibrations when nothing is touching the table. A slight earthquake on the opposite side of the earth sends the oscilloscope pattern spinning violently.

Many of the angular components

Receiving parts in the cleanroom through an airbath tunnel where they are subjected to a 35 mph airstream bath. When employees enter the cleanroom they get a similar airbath.

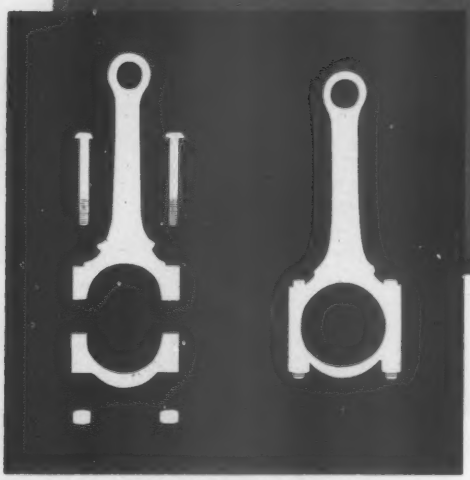
must be accurate to within one second of an arc. This is equal to the angle at the top of a triangle 40 miles high and a foot wide at its base, or the angle through which the eye would switch in viewing the two edges of a dime 2-1/2 miles away.

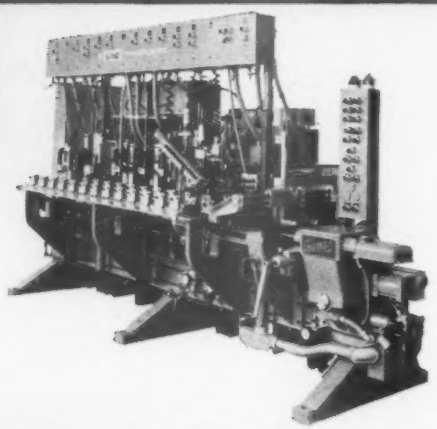
With accuracies like this to maintain, it is not hard to imagine the effects of a speck of dust separating two fitted surfaces, or what occurs if the part is expanded or contracted by a change in temperature, if a slight amount of surface oxidation occurs, or if the volume of a part increases slightly because of moisture absorption.

We at Nortronics would like to think that our new cleanroom approaches the ultimate in perfection, but we know this is not so. For in our fast moving scientific world, it is with cleanrooms as it is with all other scientific endeavor; by the time a product is built it is almost obsolete. Plans are currently being formulated for the incorporation of newer requirements such as complete assembly in a sterile atmosphere, dynamic testing in a physically and chemically clean area prior to hermetically sealing components. We know that all parts and material leaving earth for outer space will have to be completely sterile. We cannot risk contaminating outer space with our earthly micro-organisms or disease producing bacteria. •

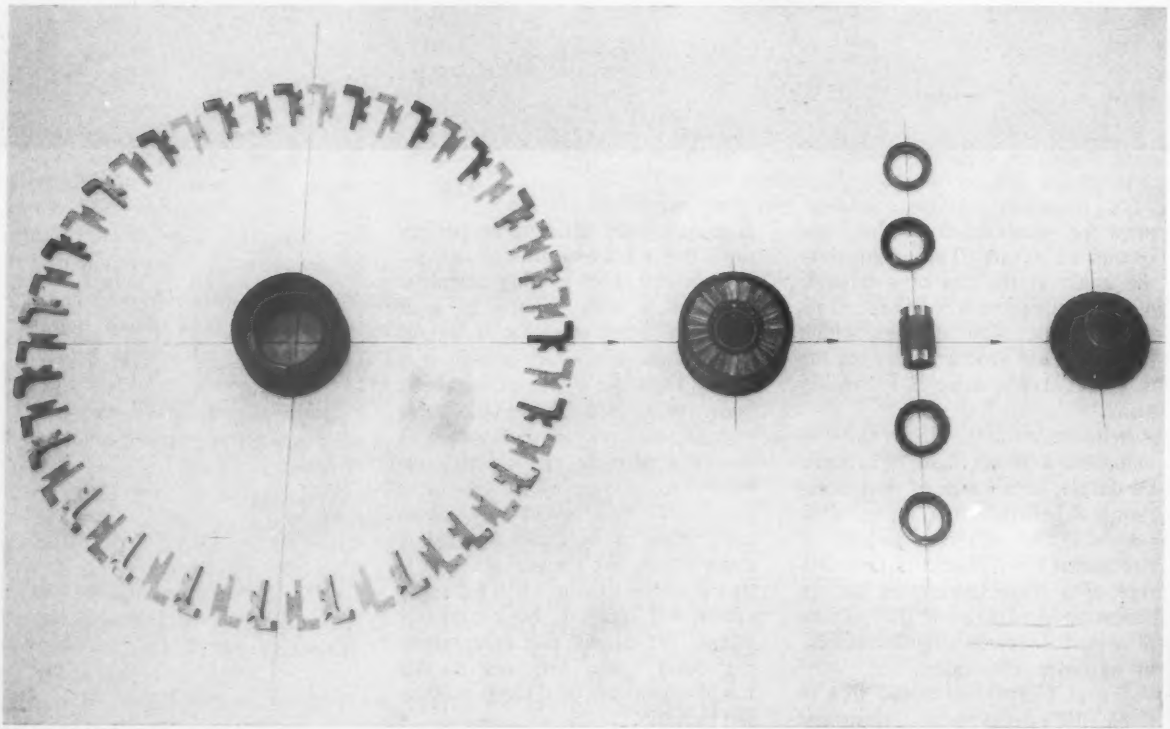
In bench assembly area in the cleanroom, the power turrets at each work station provide electric power in all forms and phases, compressed air at 15 psi, dry nitrogen, and a vacuum line.

SIMPLE OR





Transferline machine similar to one at right assembles connecting rods. Last two stations employ pneumatic tools to run-up nuts and tighten bolts to required torque.

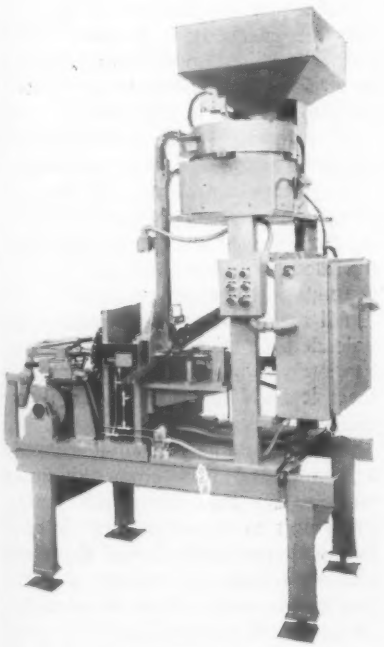


COMPLEX JOBS...

automatic assembly can help you

Presenting a few examples of how automatic machines can speed the assembly of high-volume components. Also cited is example of how a slight design change can facilitate automatic assembly.

by **Rudy Mate,** Associate Editor



Inserting 23 riser-type segments and 23 insulators into commutator ring was tedious hand operation until this machine was developed. It assembles 218 commutators an hour.

American industry's last great frontier for cost reduction is in the assembly phase of manufacturing. For high production items, whether simple or relatively complex, specialists in the automatic assembly machine field can be instrumental in helping slash costs while improving product quality.

One such specialist is the Gilman Engineering & Manufacturing Company. A subsidiary of Parker Pen, this firm has made great strides in this field, especially since their development of a cam-indexing straight-line assembly machine about two years ago. Their success with this machine has been credited to a concept of basic machine standardization. (They still design and build other types of assembly machines, one of which will be described later.)

Tooling from the basic machine, known as the Transferline, can be adapted to machines designed to assemble a variety of medium-sized parts. We viewed three such machines undergoing proving-out tests at the Gilman plant in Janesville, Wisconsin, prior to shipment to different automotive parts plants.

ROCKER ARMS

One 16-station machine has a gross production rate of 1200 rocker arms an hour.

Rocker arm bodies are manually loaded into a bank track. At the first station, the machine fixture is cross-transferred and positioned for the pick up of a rocker arm. The fixture is then indexed for the automatic pick up of the arm, and is moved to the third station, where the arm is oiled and checked for subsequent operations. At the next station, a screw is hoppered, tracked, escaped and run to a fixed height. The arm is then moved for application of a nut. After this operation, two stations complete the rotating of the rocker arm, so that it is in position to receive the rest of the assembly, which includes a spring, spring retainer cap, the

continued

eccentric and a tiny roll-type pin.

After the pin is inserted and set, the completed assembly moves to the next station, where it is automatically unloaded. The fixture is then transferred to the return line, to move up to accept another assembly.

One of the features of this particular unit is the hoppering, feeding and installation station for pressing the tiny pins into the assembly.

A hopper tracks the pins into a shuttle mechanism at the hopper and allows the parts to flow without jamming together at the exit of the bowl. The shuttle mechanism carries the pin from the hopper to a tubular track through which individual pins are fed by air pressure to the pin loading station.

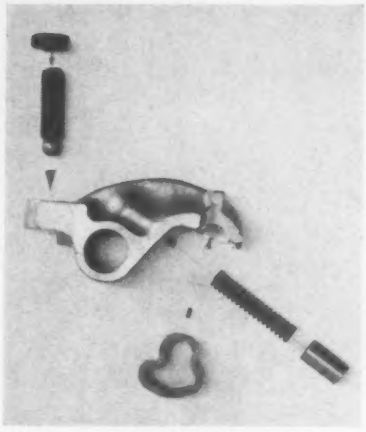
The loading station mechanism locates the pin at the proper point on the arm and drives it into place by the action of a controlled air cylinder.

Basic to the standard machine is the locking out mechanism, which operates on a "sequential memory" system. Each loading and assembly operation is checked to determine that it has been completed properly. An incomplete or faulty function at a work station does not stop the machine, but passes to the next station the information that the assembly has not been completed. From that point, each succeeding station passes on the malfunction information. At the final station, the received information actuates a gate, which prevents the part from falling into the completed assembly bin.

Parts quality also becomes important. The assembly machine stations are designed to stop, or lock-out, when a faulty part reaches a station. Even the presence of foreign matter becomes critically important. With the "sequential memory" system, the machine exercises quality control over the entire assembly. Indicator lights indicate proper operation or malfunction of each station in the line.

TRUNK LID LOCKS

Where it is necessary, we noted, manual operations can be harmoniously incorporated with the automatic assembly operations. One machine, for turning out automotive trunk lid locks, was using a manual loading operation. Because of its



This 7-piece automotive rocker arm is assembled in a 16-station machine capable of turning out 1200 arms an hour.

configuration, the lock bodies were loaded manually into the fixture on its return cycle.

However, before the internal mechanism could be automatically assembled, an important component part—a small spring—had to be redesigned. This spring actuates the slide-locking device. Because of its initial design, the spring could not be properly oriented for hopper feeding. By redesigning the spring so that one end was weighted more than the other, vibratory feeders were capable of orienting the spring automatically, making the internal assembly of the lock a completely automatic operation.

CONNECTING RODS

Another manually-loaded machine being proved out, was a 10-station connecting rod assembly machine. The machine operator manually loads the rods and caps onto an infeed walking beam track. The rods are suspended at the wrist pin end and the caps are positioned on a flat rail directly below the rods. Both rod and cap are oriented manually for the bearing lock groove, at the time of loading.

As the two parts enter confining rails, they are checked for presence. If either part is missing, the transfer mechanism dwells until both parts are present, at which time they are engaged by a cam-operated transfer arm. Supporting the rod at the wrist pin hole and the cap at the machining location bosses, the parts are transferred to a checking station. A probe checks the bolt holes in the cap and rod for drilling, size, and presence. Feeler fingers check the bearing lock grooves in the cap and rod for proper orientation. If the lock grooves are omitted or not oriented properly, this does not stop the machine. The assembly is simply diverted as a reject at the final station.

At the next station, hopper-fed bolts are oriented and lightly pressed into the assembly to maintain bolt orientation during transfer.

The bolts are then pressed into the assembly with a "C" frame type hydraulic ram, exerting a controlled press force up to approximately 16,000 lbs.

After pressing the bolts in place, they are checked for presence and proper seating. Loose bolts caused by oversize holes or undersize bolts are also detected at this station.

Transferring to the next station, the bolts are loaded and pneumatic nut runners turn the nuts up to within one or two turns of seating. At the final station, pneumatically-operated wrenches seat and drive the nuts to the required torque.

All assemblies are automatically unloaded from the machine, immediately following the final check. Complete and incomplete assemblies are automatically separated.

In these assembly machines, cam-actuation and transfer of loading motions are made from the same drive unit to assure positive interlock and synchronization of the machine functions. In addition, a spot pin locates and centers the fixture at each work station.

STARTER COMMUTATORS

A different type of automatic assembly machine also being proved out made a previously time-consum-

ing hand assembly job into a relatively simple automatic assembly operation. This ingenious machine assembles starter commutators at the rate of 218 an hour.

Segmented ring fixtures held together in tension by springs are fed into a banked track of the machine. At the start of its cycle, the riser-type segments of the commutator are hopper-fed to a storage track. The insulators are fed into the storage track directly from the supplier's box.

After the ring fixture is expanded by pushing spacer blades forward into the rings, the machine starts feeding the proper number of segments and insulators. When a ring is completely filled, the mandrel which holds it stretched apart is withdrawn, and the ring is released so that it can roll out of the machine, making room for another fixture and cycle.

After the performance of other operations, the ring type fixtures are fed back into the machine.

These are just a few examples of how automatic assembly machines can help American industry turn out better products, at lower cost, and at a faster rate. •

Economic evaluation of automatic assembly machines

by **J. W. Van Camp**
Comptroller
Parker Pen Company
Janesville, Wisconsin

We have found in making our economic evaluation of proposed capital expenditures that an automatic assembly machine is the easiest type of machine to evaluate. The results are more clear cut than evaluations of any other type of production equipment. The reason for this is the tremendous cash savings which can result from automating manual operations.

In most other studies, the cash savings are not nearly as immediate or significant, and it becomes necessary to expand the evaluation study to include other areas that would be affected in the equipment acquisition. There are many different fomulas followed for these more complex studies such as MAPI. Frankly, our opinion of these formulas is that they are too theoretical and complex. We prefer to use the simple approach of comparing direct cash savings to the amount of the expenditure. We feel that there are several dangers inherent in using a stereotyped formula which can result in erroneous conclusions. Therefore, we do not use any pre-printed forms and do not prescribe a standard analysis system to be followed.

In evaluating a proposal for automatic assembly equipment, there are usually two alternatives to be considered: (1) cost of the present assembly method, (2) cost of the mechanized assembly operation.

When a proposal of this type has been considered at Parker Pen, our manufacturing people have brought us in on the study in its very early stages. This has been a great advantage in that it has considerably shortened the over-all length of time for the study. It has permitted us to compile the data needed in the study in conjunction with them.

Several of the more important factors which must be considered in making this economic evaluation study include the following:

1. Initial cost of the machine and its tooling: (a) additional machines are usually less expensive than the initial machine which must bear the cost of design and development; (b) can use different length of life for different parts of the machine; (c) installation costs lower than the standard 10 per cent of purchase price, with cost of de-bugging included in the purchase price.

2. Cost of additional tooling to adapt the basic machine to anticipated product modifications.

3. Direct labor savings: (a) machine assembly anticipates fewer employees but with different skills; (b) assumption as to yield from the machine—in our study we anticipated the machine would be inoperative for one reason or another the 20 per cent of the time; (c) fringe benefit savings because of reduced personnel, savings which can be partially offset by increased unemployment costs unless personnel reduction can be achieved through normal turnover.

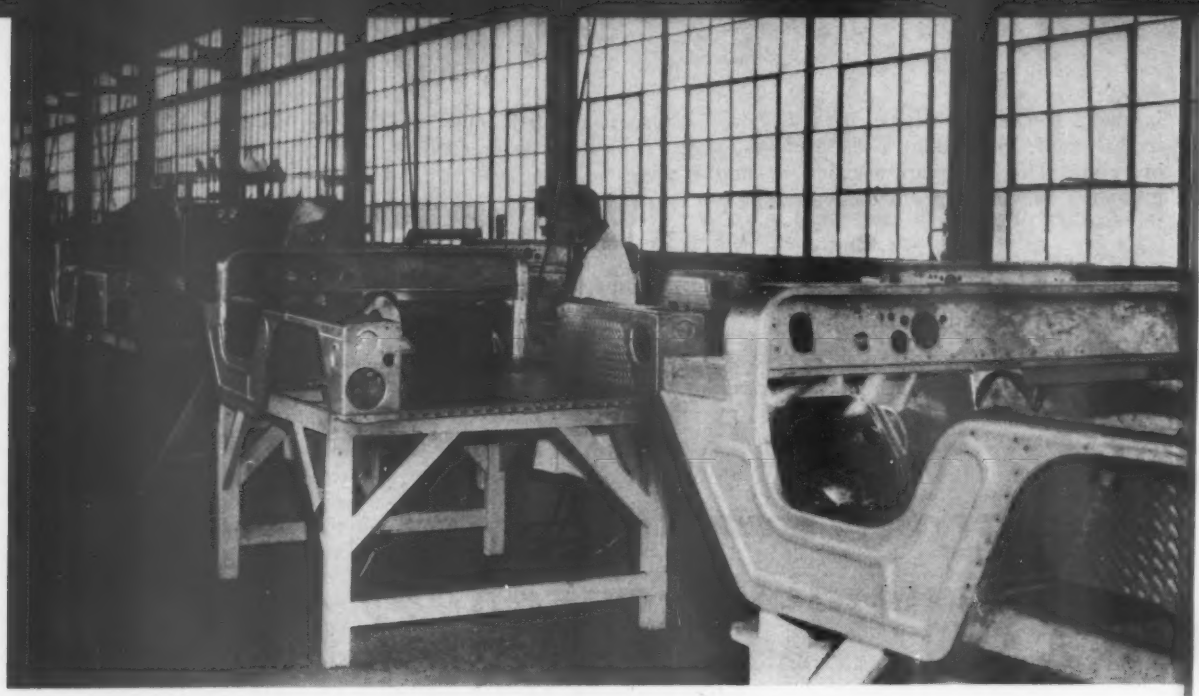
4. Capability of machine: (a) is it likely to cause a bottleneck in the normal flow of production; (b) can the flow of parts be scheduled so that the machine will never need to be shut down because of the lack of a single part?

5. Machine maintenance: will this cause any problem in the flow of production?

6. Improved quality of finished parts: automatic scrapping of nonstandard parts because the machine is constructed so as to reject parts which do not fall within certain tolerances.

Following these basic steps, last March, we reviewed a Jotter pen cap assembly machine proposal. The results of our study showed that cash savings would equal the purchase price of the machine, plus the cost for modification tooling in a period of approximately 18 months. In operation for several months now, this assembly machine* has given us a significant reduction in cost as well as a significant improvement in the quality level of finished Jotter caps in our final assembly operations. •

*See "Why Parker Pen Turned to Automatic Assembly", November 1960, Assembly & Fastener Engineering.



Design and assembly highlights of the Mity-Mite body

A report on unusual details concerned with production of the high-strength, low-weight body for the four-wheel Mity-Mite at new Twin Coach division.

Here tailgate components are riveted together. In production tailgate for the Mity-Mite some 160 details had to be designed and joined together.

Separate from their airframe and missile division, Twin Coach Company has set up a special products division in Waverly, New York, to take on work in the general vehicle field. One of the first really knotty problems handed their manufacturing personnel was production of the body for the Mity-Mite vehicle. Specifications from American Motors called for an exceedingly strong yet very light body, weighing no more than 120 pounds.

USE "BOX" SECTIONS

Engineers at Twin Coach solved the problem by the creative use of "box" sections, effectively reducing the number of details of the body; and the application of unusual embossing methods.

Box sections made it possible to construct the body without the heavy extrusions generally required in traditional vehicles. The body

floor is very strong through the use of embossed details plus the box shape in the form of "hat", channel, and "double hat" box sections. Engineers employed an unusual use of the box section in the splice that joins the cargo area and the cab section. Two units of the body are joined by overlapping and nesting of details. In addition, the box section provides a protected passageway for the laying of electric wiring from the engine to the rear of the vehicle.

TAILGATE A PROBLEM

The tailgate of the Mity-Mite was a difficult problem in itself. It had to be sufficiently strong to withstand heavy pressure from loads carried in the cargo area. In addition, it had to provide a secure anchor for two jump seats. Specifications from American Motors called for two seats plus the backrest to be storable within the 1½ inch over-all thickness of the tailgate without the use of loose components. In producing the tailgate some 160 details had to be fashioned and joined together.

WEIGHT-SAVING IDEAS

The minimization of the number of components of the body produced a good deal of weight saving. The initial design for the Mity-Mite, for example, required four reflectors —one on the corner of each wheel well. Twin Coach production engineers decided not to add a ring-holding unit for the reflector. Instead they indented the metal while forming the flanges thus making the holding unit part of the wheel well. This type of simplification was used in the access doors, the cowl windshield attachment, and the sill section. The body was lofted and the components were perforated before forming. The accuracy of this aspect of the manufacturing can be understood by realizing that the spotweld assemblies were made without the use of fixtures. The components were pre-assembled with Cleco pins which accurately register adjacent details by picking up lofted holes. After spotwelding, the pins were removed and the holes filled with rivets.

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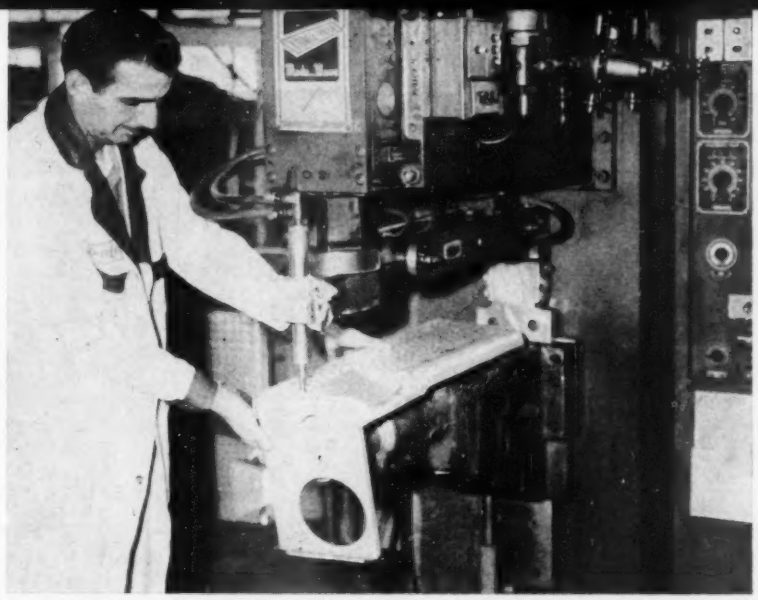
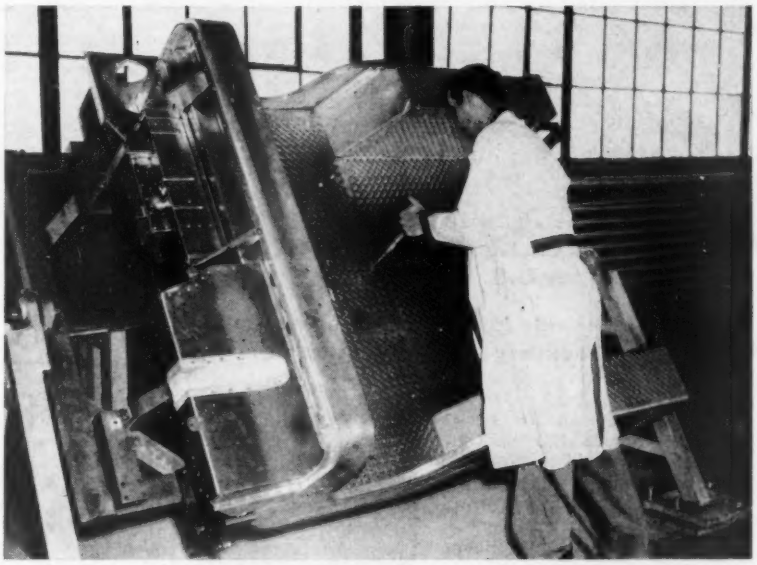
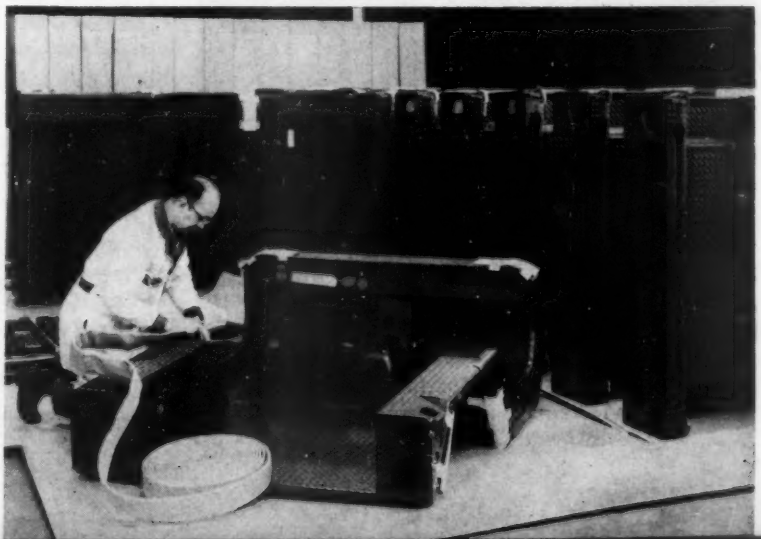


Spot welding is done after parts are pre-assembled with pins for accurate register. After welding, pins are removed and holes filled with rivets.

Cargo area assembly shows degree to which embossing is used to give additional strength to .063 aluminum sheet used in 95% of vehicle body.



Here completed bodies are prepared for shipment to final assembly plant.



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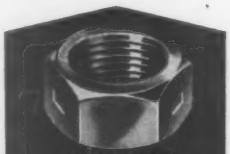

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Assembling the Mity-Mite Body, continued

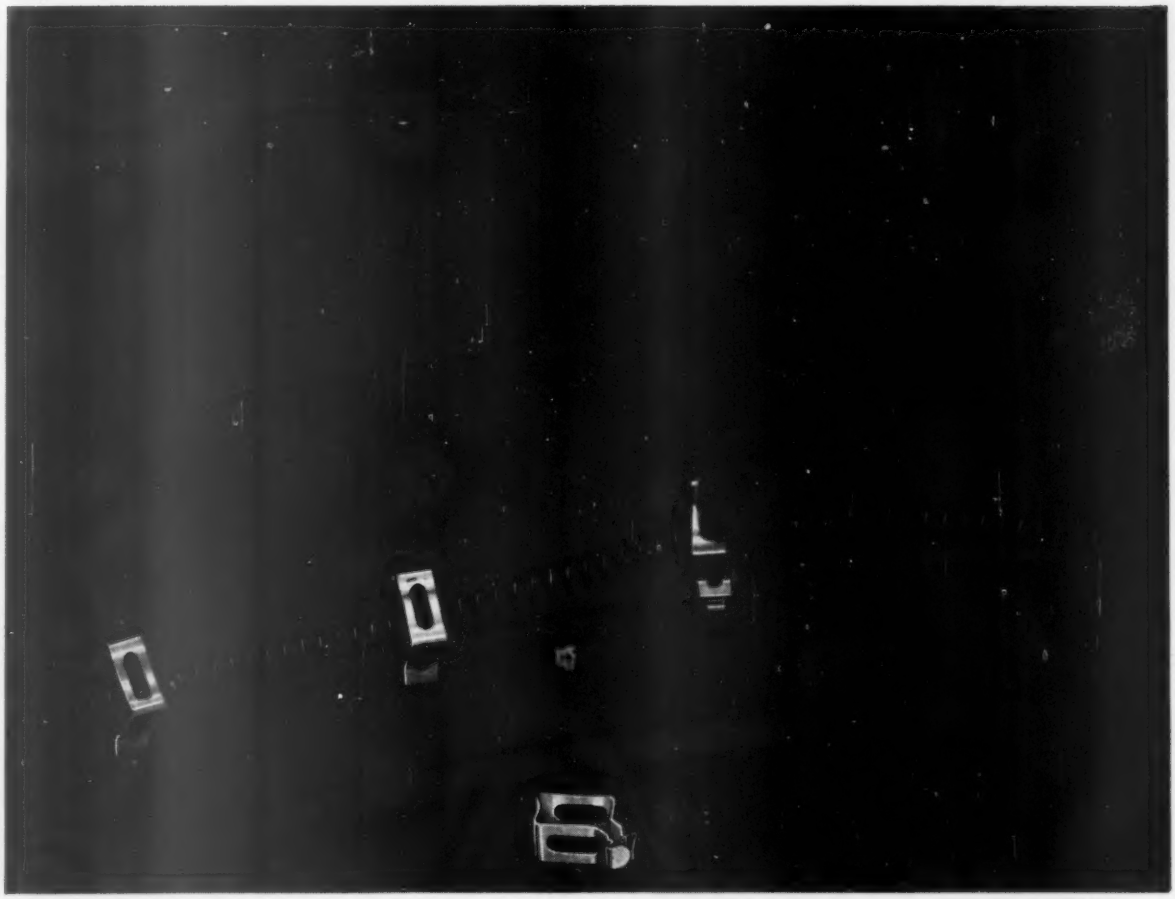
Embossing techniques were used on many details of the Mity-Mite vehicle. Embossing is the use of surface indentations of a symmetrical nature to strengthen sheet metal by work hardening it, and by changing the axis of the metal to get additional stiffness. In some instances Twin Coach developed 35 different embossing patterns until a proper pattern was obtained, providing the required strength and stiffness in all directions. One pattern was so effective that .063 sheet aluminum could be used on 96% of the body. These embossed sheets were fully as rigid as sheet aluminum .093 inches thick.

FLEXIBLE EMBOSSING TECHNIQUE

In order to increase the flexibility of embossing, the company developed a method by which the configurations could be applied locally where required, skipping areas where the sheet was to be bent or spotwelded. Under traditional embossing techniques the embossing configurations would have had to be removed where bending or welding was to take place. This tends to lessen the integrity of the metal as well as add an extra time consuming operation. Under the Twin Coach method of embossing some 20 to 30 details could be formed and embossed simultaneously with one thrust of a press.

An example of how the embossing method was used is in a cab floor member of the vehicle. Though most of the surface of the floor member was embossed this detail had five specific areas where embossing was not applied. These were: the splice area where it joins the cargo floor, the hand brake mount, the transmission cover, the master cylinder for brake, and the cross member for the body mount. •

"Well, we finally located the missing sample of that new explosive fastener!"



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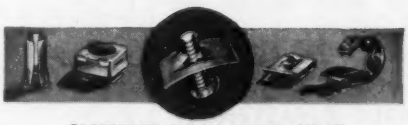


FASTEST THING IN FASTENINGS®

CANADA: Dominion Fasteners Ltd., Hamilton, Ontario. GREAT BRITAIN: Simmonds Aerocessories Ltd., Treforest, Wales. FRANCE: Simmonds S. A., 3 rue Salomon de Rothschild, Suresnes (Seine). GERMANY: Mecano-Bundy GmbH, Heidelberg.

Use postpaid card. Circle No. 224

REPRINTS AVAILABLE

- "Fasteners in the Space Age"—November, 1958
- "Hardened Plug Nuts Save Tapping"—January, 1959
- "The Fastening of Light Metals"—March, 1959
- "Design and Application of Retaining Rings" — May, 1959
- "Power Tools for Tightening Threaded Fasteners" —May and June, 1959
- "Design and Application of Weld Fasteners" — July and August, 1959
- "Torque Considerations in Design" — January, 1960
- "Which Thread — Coarse or Fine?" — February, 1960
- "Designing for Silver Brazing with Preforms"—April, 1960
- "When and Where to Use Custom Fasteners"—May, 1960
- "Resistance Welding Stainless Steel"—June, 1960
- "The Strength of Screw Threads"—June, 1960
- "Cheap Fasteners? Are You Kidding?" — August, 1960
- "The Selection and Use of Adhesives" — August and September, 1960
- "How Lubrication Affects Torque-Tension Relationships"—September, 1960

Single copies of individual reprints are free upon letterhead request. Additional copies of each reprint are 15 cents apiece.

Reader Service Department

ASSEMBLY & FASTENER ENGINEERING

Wheaton, Illinois

AS RUDY SEES IT

Got a question, challenge, puzzle to share or story to tell? Shoot it along, we'd like to meet you.

FUDGE FACTORS

One of the most oft-quoted scientific philosophers of the day, Dr. Finagle, has this to report on the Law of Nature regarding testing:

First Law: If anything can go wrong with a test, it will.

Second Law: No matter what result is expected, there is always someone willing to fake it.

Third Law: No matter what the result, there is always someone eager to misinterpret it.

Fourth Law: No matter what occurs, there is always someone who believes it happened according to his pet theory.

AND WE'LL DANCE TILL 2061

At the opening of the 87th Congress, Rep. William McCulloch of Ohio introduced a bill providing for "the centennial celebration of the observation of land grant colleges and state universities and the establishment of the Department of Agriculture. . . ."

DEFINITION

High Accuracy—The joints meet.

RUSSIAN ROULETTE

According to Diners' Club, some business men in Los Angeles are playing a new game with credit cards. At a group luncheon, everyone puts his card face down on the table, and the waiter blindly selects the one to pay the tab.

MATH OVER LIGHTLY

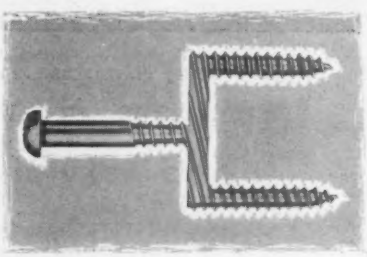
A pet store offered a baby monkey for sale at $1.25. The monkey grew. Next week it was offered at $1.85, then $5.13, then $5.94, then $9.18. On the sixth week it was sold for $12.42. How were the new prices figured. (answer on page 72).

—UCLA Engineering Student Newsletter

NEW PRODUCT

Design engineers at Dumont Industrial Screw feel that new products are a factor in today's economy. Which is one reason they are always trying to design and offer a better product to show management new ways to save money.

One of their latest products is the joining screw. This screw takes the place of two ordinary screws, effecting a 50% saving of time and labor. It is particularly useful on butt joints and miter joints.



FEE SPLITTING

The University of Minnesota medical school levies a 5% assessment on fees collected by faculty members from outside patients.

DEFINITION

Research—Taking credit for work done by others to prove something we've known all along. —Auburn Mfg. Co.

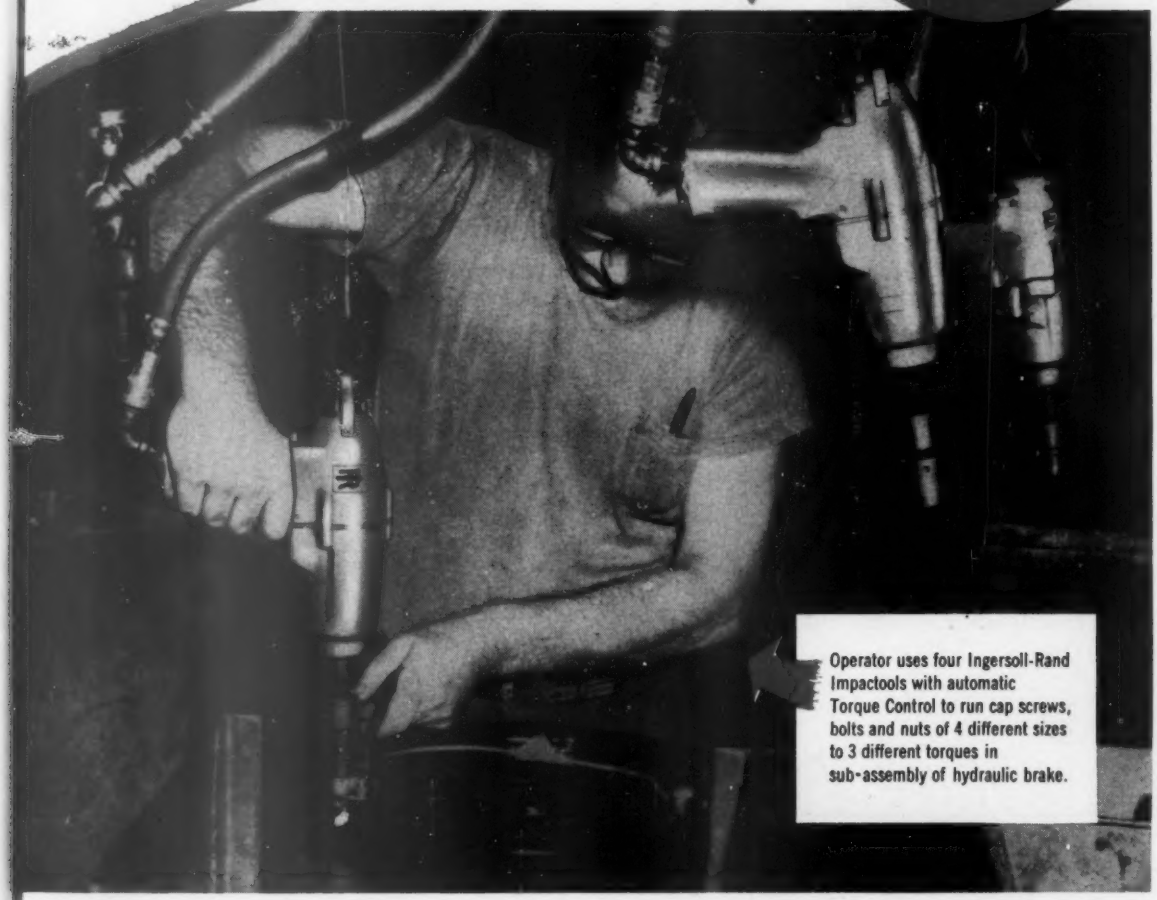
SUMMING UP

Commenting on present business conditions, a mutual fund company completed their report with the statement that: "Business is both good and bad, and the outlook for the rest of the year is for a continuation of different conditions in different areas."

"Business is like a bicycle, when it isn't moving forward at a good speed, it wobbles"—Palm and Patterson, Inc.

IMPROVE PRODUCT QUALITY PRODUCE 45% MORE

AT THE SAME TIME!



Operator uses four Ingersoll-Rand Impactools with automatic Torque Control to run cap screws, bolts and nuts of 4 different sizes to 3 different torques in sub-assembly of hydraulic brake.

By replacing ordinary air and electric impact wrenches with Ingersoll-Rand "automatic shut-off" torque control Impactools, the problem of driving cap screws, nuts and bolts to 3 different and precise torques has been eliminated. Quality is assured!

At the same time . . . production on this job has increased by 34% to 45% per manhour depending on the model being assembled! And . . . this manufacturer has solved his "quality bottleneck" on 11 other operations with additional reliable high-production, Torque Control Impactools.

This extra output means a Dividend on Payroll Dollars for this manufacturer of from 34% to 45% of the operator's wages!

You can calculate your own dividend with the help of Ingersoll-Rand's new, illustrated guide-book, "How to earn a Dividend on Payroll Dollars with Planned Annual Retooling" . . . and handy Dividend Computer. Call your nearby I-R Representative or write Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

Planned Annual Retooling increases output per man

43A-8

Use postpaid card. Circle No. 225

the new symbol of creative engineering

... with the background of time tested experience

For almost two decades we have been creating talented fasteners to solve the problems of modern industry. Whenever you see the GLS symbol you may expect custom fasteners that will do the most work with the least effort and cost to you. Great Lakes Screw Corporation engineers will welcome the opportunity to review your fastener needs and recommend how you can get your *net profit* objective off the ground. Look for the GLS symbol—it assures you of the best creative engineering, and—it is your *guarantee* of finest quality.

GSL

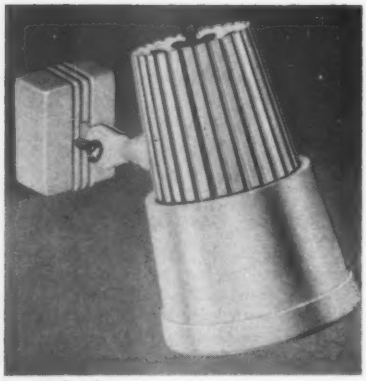
GREAT LAKES
SCREW CORPORATION

EXECUTIVE OFFICES • CHICAGO 27, ILLINOIS

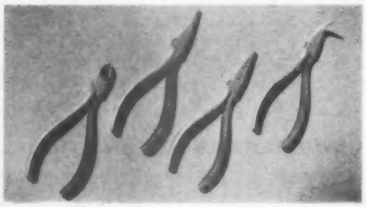
Use postpaid card. Circle No. 226

WHAT'S NEW IN EQUIPMENT

For information on any equipment listed here, use the postpaid card opposite page 58. Just circle the number on the card matching the number following the description. We'll do the rest.



See Number 1



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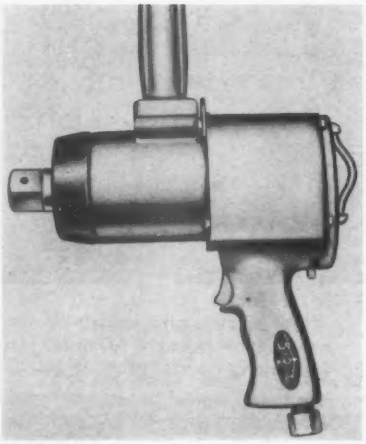


See Number 3

MAGNETIC BASED LAMPS FOR ASSEMBLY BENCHES

A line of magnetic based lamps offers a solution to the problems of rigid positioning of lamps for permanent or temporary use. The units are designed primarily for utilization where problems of adequate work area lighting are acute.

The lamps are available in two styles; the Arealite offers a wide coverage of illumination and Magnaspot provides a concentrated light in a localized area.

The lamps are custom molded of high impact plastic and are engineered to provide a "cool to the touch" exterior. They can be provided with either a tubular or flexible extension arm.

The permanent magnetic lamp bases have a holding power of 60 lbs.

Recarr Incorporated, 126 N. Clinton St., Chicago 6, Ill.

Use postpaid card. Circle No. 1

NON-SPARKING SAFETY PLIERS FOR ELECTRONICS

A group of miniature safety pliers, ideally suited for use in electronics, radar and other electrical applications are non-sparking. The line includes curved needle-nose, duck-bill, long-nose, and diagonal-cutting types.

Made of a special alloy of beryllium and copper, the miniature pliers are non-magnetic, non-corrosive and do not spark under severe use.

The Beryllium Corporation, PO Box 1462, Reading, Pa.

Use postpaid card. Circle No. 2

AIR IMPACT WRENCH HAS FASTER RUNDOWN

A heavy duty, 1" square drive air impact wrench has an improved air motor and housing coupled with an impact mechanism of advance design.

Air entry, through a ½" inlet, coupled with the streamlined housing assures free air flow with minimum restriction. With more air moving at higher speeds the wrench accelerates rapidly for faster rundown.

The reversing valve with related volume control for right hand operation is leakproof. Bails provide for horizontal or vertical suspension.

The model 482 is recommended for heavy duty applications requiring the high speed, high torque and fast run down characteristics.

Albertson & Company, Inc., 3101 Lowell Ave., Sioux City 2, Iowa.

Use postpaid card. Circle No. 3

SOLDERING IRON SADDLE HOLDS ANY SIZE IRON

Lightweight metal holder for hand soldering irons is designed to be mounted permanently in place on the work bench, or for use as a movable cradle.

The removable asbestos rest is notched at the ends to adjust to any size iron tip.

Made of 18 ga steel, the iron saddle is available in three sizes; 3½", 5½" and in an adjustable model that varies in size from 4" to 6½".

Falls Laboratory, Inc., 2217 Nottingham Way, Trenton 9, N.J.

Use postpaid card. Circle No. 4

TOOL BALANCER HOOKS EASILY TO OVERHEAD BEAM

A line of pneumatic tool balancers and air hose couplers is completely portable, and hooks easily to an overhead beam.

The balancers feature heavy duty construction, fast reel return, easy tension adjustment, safety declutching, and adjustable cable stops.

The Airetool Manufacturing Co., 302 S. Center St., Springfield, Ohio.

Use postpaid card. Circle No. 5

CUTTING FLUID APPLICATOR HELPS CUT FLUID COSTS

Applicator, for use with cutting fluids, cuts fluid costs by as much as 75%. The unit consists of a hand squeeze bulb, connecting vinyl tube and special ejector head which screws to any standard 1" neck screw-neck can.

Purpose of the Fluid-Miser is to ap-

You can solve all your staking problems for just $135 with the NEW portable, all electric

ELECTROSTAKE

BLACK & WEBSTER INC.
570 PLEASANT STREET, WATERTOWN 72, MASS.

Gentlemen:

Please send me information about the Series 4 Black and Webster Electrostake models F.S., B.S. & S.M.S. which:

1. stake up to 120 units per minute with controlled impact to 3500 lbs.
2. are easily movable from job to job
3. never need air lines
4. don't require skilled labor
5. set up easier and quicker
6. cut costs, time, labor

NAME

COMPANY

STREET

CITY ZONE STATE

DEPT. 25

Use postpaid card. Circle No. 227

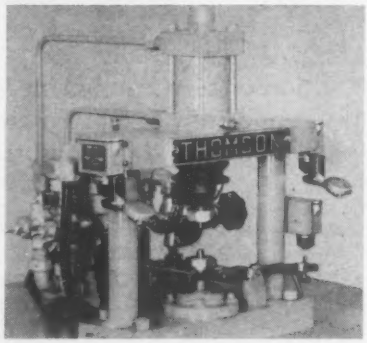
ply correct amount of fluid by remote control, eliminate unnecessary waste and permit properly timed ejection at the work point, without interrupting work rhythm of the operator.

The squeeze bulb can be hand or foot operated. It is attached at the most convenient point for instant fluid ejection.

Tapmatic Corporation, 845 W. 16th St., Costa Mesa, Calif.

Use postpaid card. Circle No. 6

TRANSISTOR WELDING UNIT USES LOW INERTIA SYSTEM



A projection welding machine for welding TO-18 and smaller type transistors is designed to improve the concentration of weld pressure around an extremely narrow lip on transistor caps, and to overcome pressure drag that occurs at the moment of upset.

The model 250 is a two-post, direct tension unit with a low inertia spring load assembly acting as the lower electrode.

A thyratron control panel, mounted in an adjacent cabinet includes all necessary electronic devices to properly sequence and time the squeeze, weld, cool and return cycles.

Thomson Electric Welder Co., 161 Pleasant St., Lynn, Mass.

Use postpaid card. Circle No. 7

DEPTH GAGE HANDLE MEASURES TAPPED HOLES

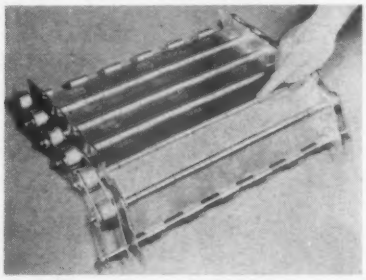
A universal adjustable depth gage handle permits gaging both size and depth of all drilled and tapped holes in one operation.

The adjustable handles are available in four sizes and may be used with American Standard thread gages for measuring standard tapped holes, and with a pin gage for measuring drilled holes, in addition to the full line of Heli-Coil thread gages.

Heli-Coil Corporation, Shelter Rock Lane, Danbury, Conn.

Use postpaid card. Circle No. 8

HINGED-STEEL BELTING HAS SHORTER PITCH LINKS



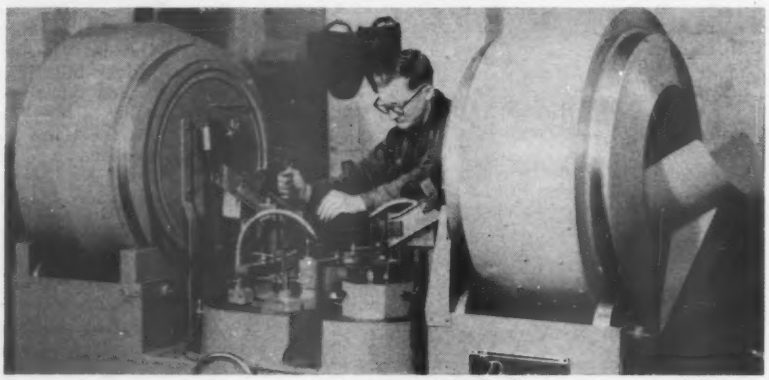
A line of heavy-gage, hinged-steel conveyor belting, with specially designed short-pitch belt links, is compatible with existing conveyors using hinged-steel belting. The shorter pitch link permits a considerable reduction in over-all section depth of conveyor designs.

Fabricated from ⅛" thick steel, each link has a 2½" pitch.

The belting was developed for handling materials such as nuts, bolts, stampings, castings, and other items

continued

MACHINE THREAD ROLLS SEVEN-INCH BLANKS AUTOMATICALLY



A planetary thread rolling machine automatically threads parts seven inches long. The same machine is said to handle blanks eight inches long and maximum diameters of 5/16". Production speed on the seven inch blanks is reported as 200 pieces per minute.

Small screws, nails and similar parts can be thread rolled as 600 to 800 pieces per minute.

Prutton Corporation, 5305 W. 130 St., Cleveland 30, Ohio.

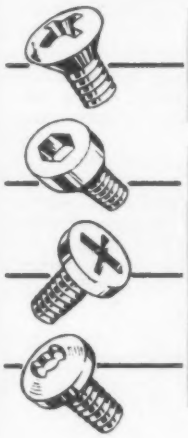
Use postpaid card. Circle No. 9

DRIVE RECESSED HEAD SCREWS FASTER

PERMANENTLY
MAGNETIC *Bit Holders*

FOR POWER DRIVING WITH HEX INSERT BITS

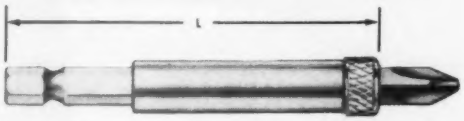
Magna-Tip Bit Holders contain a high energy permanent magnet in the shank of the bit holder which transfers magnetic energy to insert bit for holding screws on bit. Patented friction bit retainer ring permits quick, easy change of bits. Where close clearances are encountered, retainer ring may be removed. Extra lengths available.



Screws

HELD FIRMLY FOR ASSEMBLY

EXTRA LENGTH MAGNA-TIP BIT HOLDERS



Standard Length Dimension L = 2⅞"

L3 Dimension L = 4"	L6 Dimension L = 7"
L4 Dimension L = 5"	L8 Dimension L = 9"
L5 Dimension L = 6"	L10 Dimension L = 11"

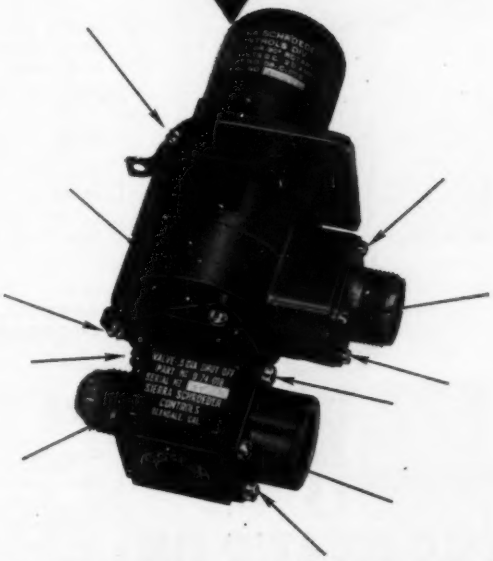
A Complete Line of MAGNETIC
BIT HOLDERS • FINDERS • SOCKETS

Magna-tip®

MAGNA DRIVER
CORPORATION
779 WASHINGTON ST. DEPT. AF2
BUFFALO 3, N. Y.

Use postpaid card. Circle No. 228

LONG-LOK®



Use of Long-Lok Self-Locking Screws on this Sierra-Schroeder Controls Model 74-01B Valve eliminated lock wire, provided repeated re-use — simplified field service. Long-Lok Self-Locking Screws are used on the housing of this valve as well as on the gear train mounting where an extremely restricted assembly area makes the use of lock wire a time consuming and prohibitively expensive operation.

Long-Lok Self-Locking Screws can speed and improve your assembly operations — provide important savings in time and labor — assure highest reliability.

Available in all head sizes and styles — have wide temperature range — qualified to MIL-F 18240 specifications — head marked for self-lock identification.

If you have a fastener problem, Long-Lok can help you.

WRITE FOR CATALOG LL-61

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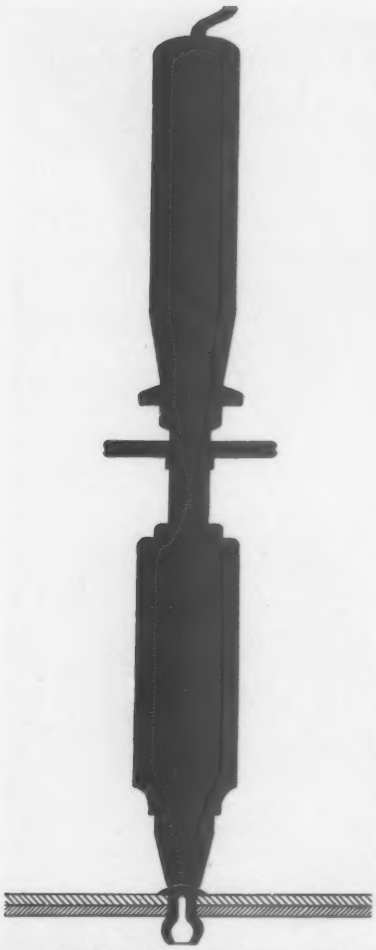


THE HEAT'S ON

And difficult fastener problems are solved

New one-step, "touch and go" blind expansion riveting takes just a touch of heat and the job is done . . . *instantly!*

Developed by DuPont, this new idea in fasteners is safe, simple and economical. All you need is a soldering iron.

- One unskilled operator can set up to 25 per minute.
- Fasten metal, wood, rubber, fibreboard plastic, tubing, etc.
- No expensive tooling — all you need is a soldering iron.
- Safe, positive sealing; shank expands along full length for wider grip range.
- No finishing operation required.
- Simple, one-piece design.
- Brazier or countersunk head.
- Available in brass, chrome plated brass, aluminum, stainless steel.
- Tamper proof.

Send for details

THE BOWMAN PRODUCTS CO.

Industrial Division
850 East 72nd St. • Cleveland 3, Ohio

Exclusive distributors:

DU PONT Industrial Blind Expansion Rivets

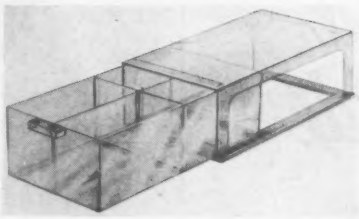
Use postpaid card. Circle No. 230

which are not big physically, but are heavy in weight.

May-Fran Manufacturing Co., 1710 Clarkstone Rd., Cleveland 12, Ohio.

Use postpaid card. Circle No. 10

LUCITE TRAYS STOCK SMALL PARTS, CAN BE STACKED



Individual drawer units made of lucite consist of transparent slideout inner drawers with accessory dividers and outside frames that interlock so units can be added to, or stacked.

The units provide visual storage for parts, screws, samples, electronic components and chemicals. They fit anywhere in racks or on shelving and are available in a variety of sizes.

Ceco Products Co., 105 Reade St., New York 13, N.Y.

Use postpaid card. Circle No. 11

SPECIAL WRENCH HANDLES INCREASE FLEXIBILITY

Hinged handles and detachable handles increase the range of industrial uses for standard ratchet wrenches.

In operation, the hinged handle allows fast hand-cranking action combined with extra handle length for final tightening. When not in use, it folds into a compact unit for storage.

Detachable handles, either threaded or pinned, can be quickly removed to fit into a kit. The pipe handle extension can be bent to order for any desired shape in an ordinary pipe bender.

Lowell Wrench Co., 97 Temple St., Worcester 4, Mass.

Use postpaid card. Circle No. 12

MAGNIFYING LAMP HAS 13 INCH FOCAL LENGTH

Especially designed for precision work, magnifying lamp is useful in labs, shops and assembly plants for drafting, fine assembly and inspection work.

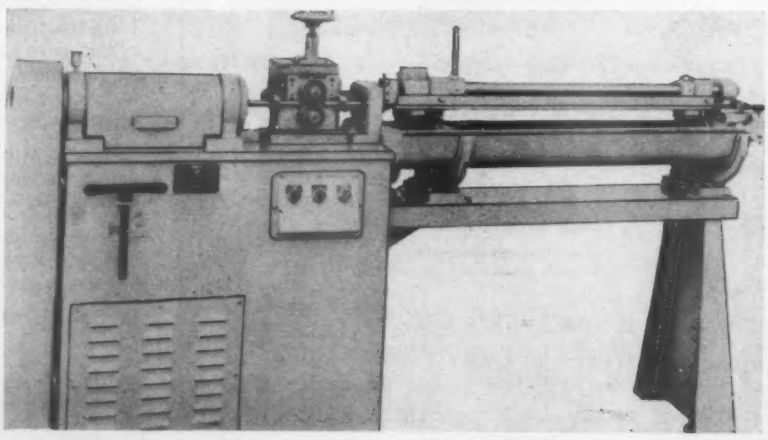
Optically-ground, five inch diameter magnifying lens has a focal length of 13 inches and a power of three diopters.

A 22 watt circline fluorescent tube supplies shadow-free illumination.

A 26 inch swinging arm provides complete flexibility and freedom of

continued

AUTOMATIC WIRE MACHINE HAS VARIABLE SPEED UNIT



A variable speed automatic wire straightening and cutting machine handles wire ranging in diameter from 1/16" to 1/8".

Features include high speed straightening arbor, with five elongated split dies, mounted on ball bearings; variable speed unit for infinite feed ranges from 25 to 150 fpm; feed roll housing; and micro switch release.

Manufactured in two standard models including one that is a constant speed machine geared to feed up to 125 fpm, both are designed for adaptation for shaped stock.

Mettler Machine Tool Inc., Boulevard Industrial Park, New Haven 4, Conn.

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For Additional Copy of this Plan Use Postpaid Card. Circle No. 310

Hobby-nizing with Mechanix Illustrated

HOME WORKSHOP PROJECT of the

For Additional Copy of this Plan
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ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

Hobby-neering with "ROCKFORD" Screw Products

HOME WORKSHOP PROJECT of the MONTH

Hobby-neering with "ROCKFORD" Screw Products

ROCKFORD, ILLINOIS

ORIGINAL DESIGNS

MARCH 1961

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2501 20TH ST. ROCKFORD, ILL.

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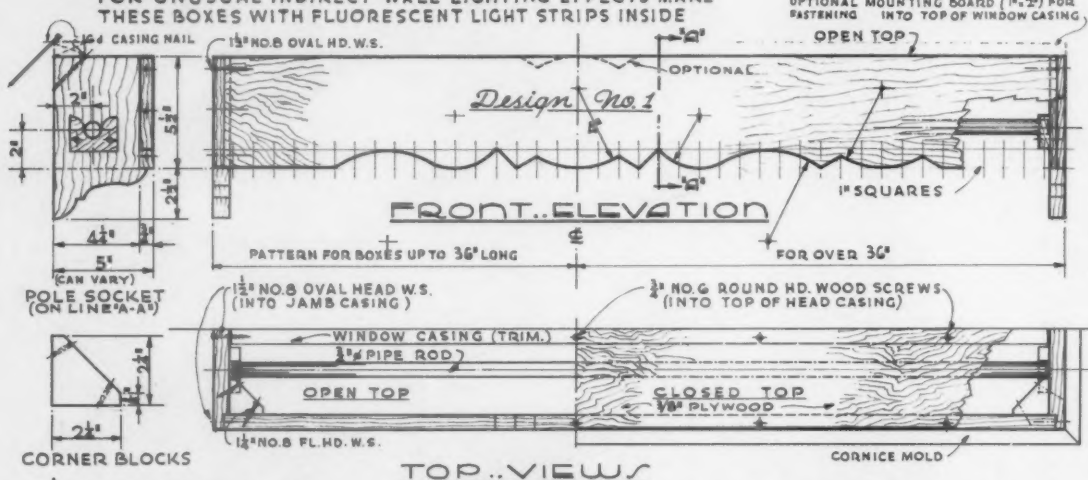
ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

Hobby-Nuring with "ROCKFORD" Screw Products

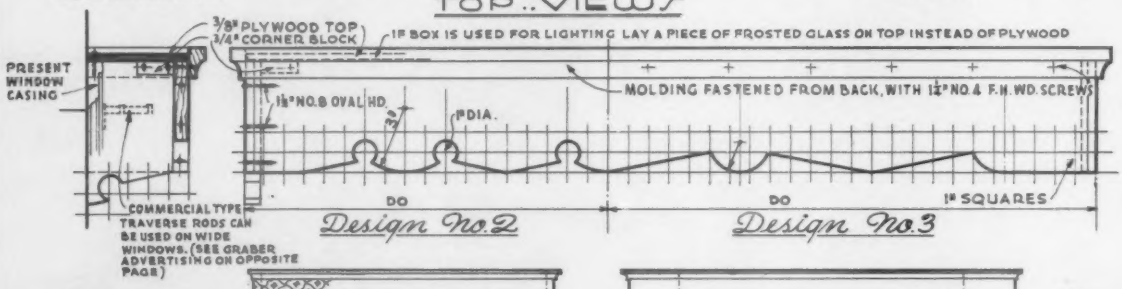
HOME WORKSHOP PROJECT of the MONTH

Drape..or..Light..Boxes

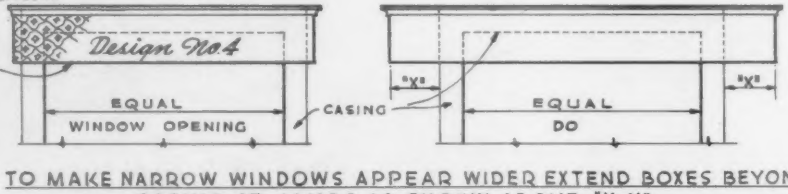
FOR UNUSUAL INDIRECT WALL LIGHTING EFFECTS MAKE THESE BOXES WITH FLUORESCENT LIGHT STRIPS INSIDE



TOP..VIEWS


3/8" PLYWOOD TOP
3/4" CORNER BLOCK
1" BOX IS USED FOR LIGHTING LAY A PIECE OF FROSTED GLASS ON TOP INSTEAD OF PLYWOOD
PRESENT WINDOW CASING
MOLDING FASTENED FROM BACK, WITH 1½" NO.4 F.H. WD. SCREWS
1½" NO.8 OVAL HD.
1" DIA.
DO
DO
1" SQUARES
COMMERCIAL TYPE TRAVERSE RODS CAN BE USED ON WIDE WINDOWS. (SEE GRABER ADVERTISING ON OPPOSITE PAGE)
Design No. 2
Design No. 3

STRAIGHT BOTTOM BOXES SHOWN HERE MAY BE DECORATED BY GLUEING WALL-PAPER OR CLOTH TO OUTSIDE FACE OF FRONT & RETURNS



NOTE:
USE "ROCKFORD" SCREW SIZES SPECIFIED. DRILL PROPER PILOT HOLES AND COUNTERSINK HEADS OR DRILL AND PLUG.

TO MAKE NARROW WINDOWS APPEAR WIDER EXTEND BOXES BEYOND CASING AT JAMBS AS SHOWN ABOVE "X-X"

INSTRUC

● IT IS SPRING H
AND A TIME OF THE
PROVEMENTS. BE
CLEAN CURTAINS
SURPRISE HER WIT
BOXES; MAYBE YOU
● THEY ARE ONE O
MAKE. I HAVE DRA
FOR YOU TO PICK FR
HAS OPEN TOP. NO.
FOR SETTING SMAL
AN INDIRECT LIGHT
FROSTED GLASS HEL
CEILING.
● BOXES CAN BE MA
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OR COVERED WITH
● WHERE WINDOW
MAKE BOXES TO FIT
JAMB CASING. FOR
BEYOND CASING AS I
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SHOWN OR STANDAR

LUMBER CAN BE
PINE, REDWOOD OR
OF FINE NATIVE OR I

USE BOXES ON W
TURES ALSO OVER
FLUORESCENT STRI
OR FASTENED TO. INS

• HAGER DESIGN STUDIO • 12-31-59

TRUCTIONS:

SPRING HOUSE CLEANING TIME AGAIN
IME OF THE YEAR TO MAKE A FEW IM-
IENTS. BEFORE MOM PUTS UP THOSE
URTAINS & SPRING DRAPES, LET US
E HER WITH A SET OF MATCHED DRAPE
MAYBE YOU LIKE TO CALL THEM VALANCES.
ARE ONE OF THE EASIEST PROJECTS TO
HAVE DRAWN FOUR DIFFERENT DESIGNS
TO PICK FROM. NO.1 IS THE SIMPLEST. IT
PEN TOP. NO.2 & NO.3 HAVE CLOSED TOP
TING SMALL GADGETS. IF BOX IS USED AS
ECT LIGHT FIXTURE, A PIECE OR PIECES OF
GLASS HELP DIFFUSE THE LIGHT TO THE

S CAN BE MADE WITHOUT SCALLOPS AS SHOWN
OR MODERN. FINISHED NATURAL, PAINTED
ERED WITH WALL PAPER OR GAY FABRIC.
E WINDOW OPENINGS ARE GOOD WIDTH
XES TO FIT BETWEEN OUTSIDE EDGES OF THE
SING. FOR NARROW WINDOWS EXTEND
CASING AS INDICATED BY "X-X" ON DETAIL.
S MAY BE USED WITH SIMPLE PIPE ROD
OR STANDARD COMMERCIAL FIXTURES.

BER CAN BE: WESTERN RED CEDAR, KNOTTY
DWOOD OR PLYWOOD IN MANY VARIETIES
NATIVE OR IMPORTED WOODS.

BOXES ON WALLS AS INDIRECT LIGHT FIX-
ALSO OVER DOOR OPENINGS. STANDARD
CENT STRIPS CAN BE INSTALLED ON WALL
NED TO INSIDE OF BOX.

HERM.

REW
LL
AND

Hobbyneering ®

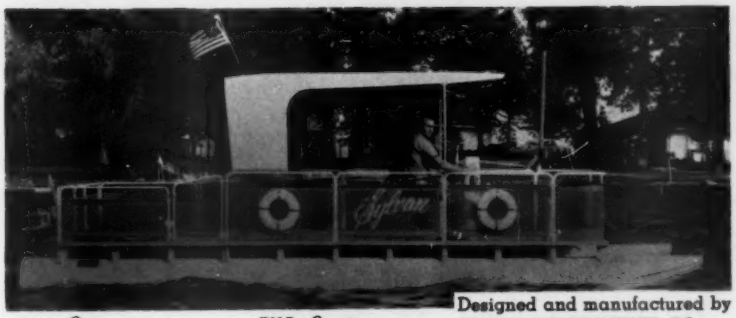
SERIES.. NO. 10

PROJECT 12

USE FOR COMMERCIAL PURPOSES IS STRICTLY FORBIDDEN

Designed by H. ROER OF ROCKFORD

★ HERE THERE AND EVERYWHERE with "ROCKFORD" Screws and Bolts ★



Designed and manufactured by
CRIPE EQUIPMENT CO.
WALCOTTVILLE, INDIANA

THE Sylvan PONTOON

17½ FT. Hatteras MODEL 174

Grady White Boats, Inc. ALBEMARLE AVE., GREENVILLE, N.C.

ROCKFORD SCREWS CONTRIBUTE GREATER ASSEMBLY STRENGTH. ECONOMY & FAST COURTEOUS SERVICE TO THE AMERICAN BOAT MANUFACTURERS, IS ROCKFORD SCREW PRODUCTS CO.'S AIM AT ALL TIMES.

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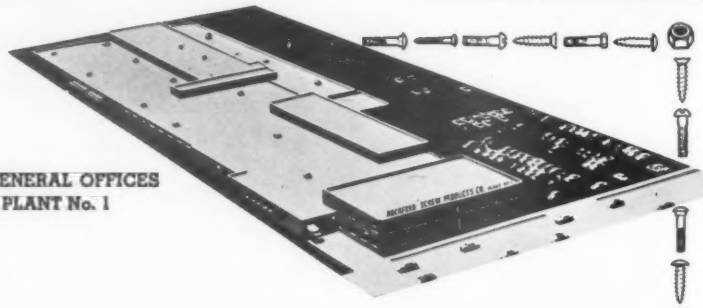
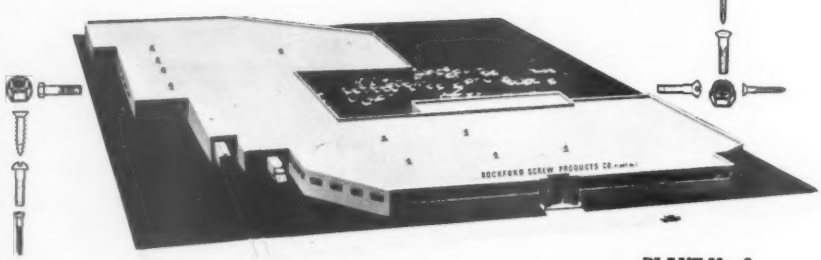
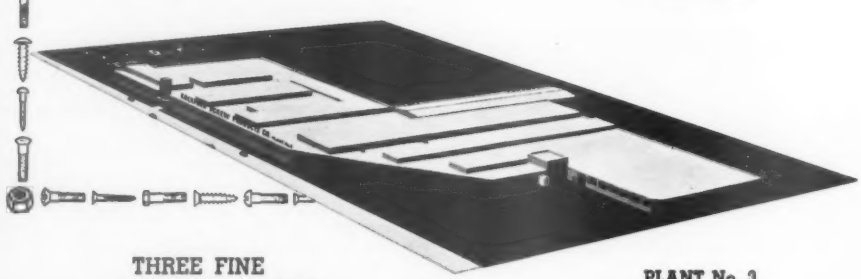
"ROCKFORD"®
Screw Products Co.
2501 NINTH STREET - ROCKFORD, ILL.



GENERAL OFFICES
& PLANT No. 1



PLANT No. 2



PLANT No. 3

THREE FINE
MODERN PLANTS
PRODUCING *"ROCKFORD"* QUALITY CONTROLLED
THREADED FASTENERS FOR AMERICAN INDUSTRIES.

For Additional Copy of this Plan
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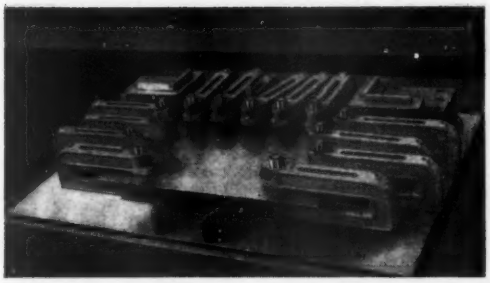
ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois

"ROCKFORD"®
HOME WORKSHOP
PROJECT of the
MONTH

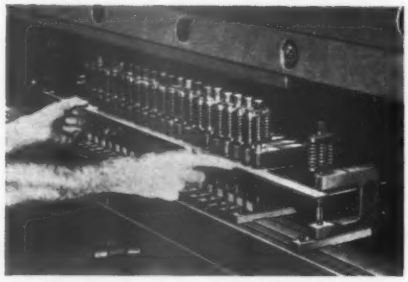
ROCKFORD SCREW PRODUCTS CO.
Rockford, Illinois
with ROCKFORD Screw Products
PROJECT of the MONTH



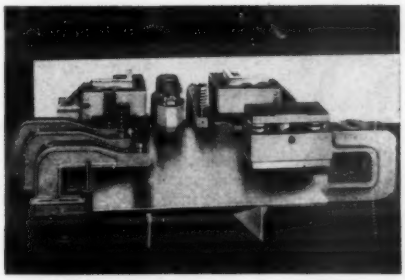
STRIPPIT eliminates expensive custom dies. Type "BN" Units used in press set-up save the time and cost involved in designing and building single-purpose dies. "BN" Units punch holes to 3.500" diameter in 10 gauge material.

Cut costs with STRIPPIT Self-Contained Tooling

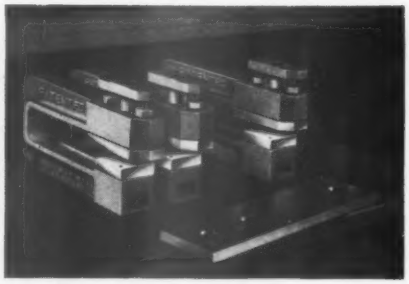
STRIPPIT gives you a complete line (including notching and slotting units) from a single source. Nationwide sales and service is available through trained tooling methods engineers. Specify STRIPPIT, the original system of self-contained tooling. Write now for the new STRIPPIT General Catalog.



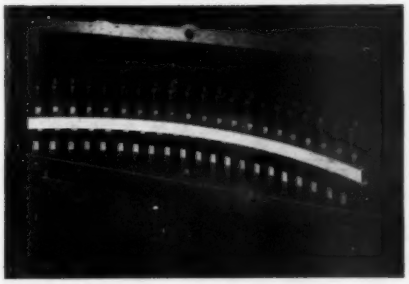
STRIPPIT lowers labor costs. Typical setup of Type "C" Units can be set up by any good bench man. No high-salaried tool and die makers needed. "C" Units punch holes to .3125" diameter in ⅛" material.



STRIPPIT assures minimum investment. "CJ" Units punch a variety of hole sizes to 3.500" diameter. Simply replace punches and dies! Re-using units reduces investment in idle dies, practically eliminates die storage problem.

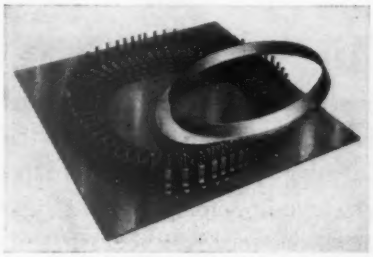


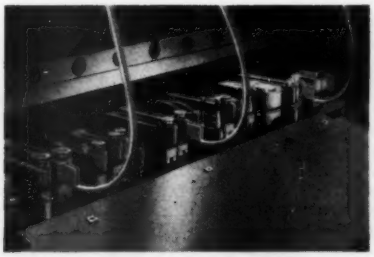
STRIPPIT shortens lead time . . . setup of Type "HS" Hydra-Strip Units shows ¾" thick punched piece in foreground. STRIPPIT tooling like this can be set up *immediately* after the pattern is O.K.'d.



STRIPPIT sets up faster, more accurately. Type "E" Units for punching holes in channels and shapes are permanently aligned. Pilot pin is concentric with punch to assure fast, accurate positioning on precision-drilled template.

STRIPPIT cuts press downtime. Type "H" Unit setup is ready to move into press as soon as previous run is finished. Nothing attaches to the press ram. Type "H" Units punch holes up to .500" diameter in ⅛" material.





STRIPPIT provides unlimited versatility. Type "BL" Pierce Nut Units punch and stake Fabristeel Multipierce Nuts, can emboss simultaneously. STRIPPIT units can be set up in any hole pattern and used over and over again.

A UNIT OF HOUDAILLE INDUSTRIES, INC.

WALES **STRIPPIT** INC.

241 Buell Road • Akron, New York

In Canada: Strippit Tool & Machine Company, Brampton, Ontario.

Use postpaid card. Circle No. 231

The quickest most practical way to put strong threads in soft materials the TAP-LOK® INSERT

SLOTTED

IN SOFTER METALS AND PLASTICS... Has full V-form external threads to provide maximum locking torque and permit wide choice of mating hole sizes. Recommended for soft aluminum, zinc die castings, sand castings and plastics. Meets requirements of MIL-MS-35914.

H-SERIES

FOR HIGHER STRENGTH MATERIALS... Has heavy wall and truncated root external thread and three-hole cutting edges for hard-to-tap higher-strength materials and to meet MIL and other specs calling for Class 3B thread fit for gaging after installation.

P-SERIES

FOR SPARK PLUG SOCKETS ... Designed to eliminate thread wear and renew damaged threads in spark plug sockets in aluminum cylinder heads. Available from stock for standard plug sizes to meet most common needs.

W-SERIES

FOR WOOD... Has coarse pitch external threads offering maximum strength in combination with ability to be driven into thin sections without splitting them. For furniture, cabinets and other wooden parts where strong, permanent threads are needed, or that are frequently assembled and disassembled.

SEE OUR CATALOG IN SWEET'S

Another fastener development from –

TAP-LOK / GROOV-PIN CORPORATION

1135 Hendricks Causeway, Ridgefield, N. J.

Use postpaid card. Circle No. 232

movement. The lamp attaches easily to any desk, drawing board, or table. Lamps with weighted bases requiring no special attachments are also available.

Acme Lite Products Co., Route 9W, Congers, N.Y.

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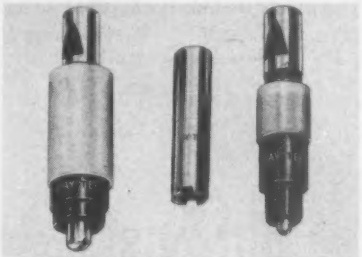
STAKING TOOL SIZE RANGE IS EXTENDED



Two types of staking tools now incorporate a built-in "pilot" pin, made slightly oversize, permitting it to be turned down to exactly fit the inside diameter of the work, thus facilitating perfect alignment of the original set up.

Affording a greater size range than the earlier line, the two JTM models are available in 19 sizes ranging from .125" to .406" adjustable in 1/64" increments.

Jay-Tee Manufacturing Co., 1515 N. 25th Ave., Melrose Park, Ill.

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PROFILE WIRE MARKETED IN COILS

Special materials, special profile shapes and more refined tolerances are offered by manufacturer of profile wire.

The wire, marketed in coils, is supplied in square, flat, triangular, oval, octagonal, and special shapes.

Held to close tolerances of plus or minus .005" to .003", the materials routinely used in fabrication are brass, copper, high-carbon steels, monel, phosphor-bronze, nickel, nickel-silver, stainless steel and resistance wire.

Radmetz Wire, Inc., 111 W. Main St., Plantsville, Conn.

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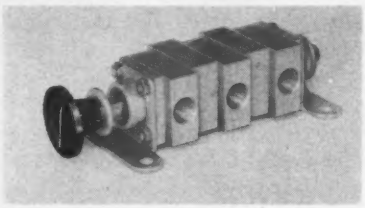
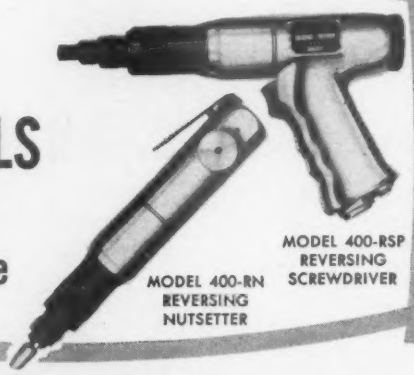
MECHANICAL OR MANUAL OPERATION OF VALVES



Mechanically or manually operated valves are designed for control of air, oil or vacuum. The ¼" NPT, 2-position balanced spool valves are available in normally-closed, normally-open, 2-

YOU NEED THESE TOOLS

to cut costs on the assembly line



Airetool pneumatic screwdrivers and nutsetters are easy to handle, easy to maneuver. And they have all the power it takes to speed up fastening operations. You get this same excellent power-to-weight ratio in Airetool lightweight sanders and die grinders, too. It will pay you to call your Airetool representative, or write us for Catalog 63.

AIRETOOL MANUFACTURING COMPANY SPRINGFIELD OHIO

BRANCH OFFICES: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge
REPRESENTATIVES in principal cities of U.S.A., Canada, Mexico, South America, England, Europe, Puerto Rico, Italy, Japan, Hawaii.
EUROPEAN PLANT: Vlaardingen, The Netherlands
CANADIAN PLANT: Brantford, Ontario

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Bethlehem engineers redesigned these cost-saving specials.

Steel

for Strength
. . . Economy
. . . Versatility

Each of these special fasteners was redesigned to do a better job. And each represents a reduction in cost for the customer. Bethlehem's fastener engineers were able to come up with improved designs to solve a specific problem.

Perhaps a fastener you are now using should be studied to see if its redesign could cut your costs. Just send us a sample of the part, or a drawing or sketch of what you need. Maximum results will be obtained when you supply a detailed description of the end use.

Our fastener engineers will look it over and give you an honest appraisal of what can be done. Call the nearest Bethlehem sales office. Or write to us at the address below.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa. Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

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3 WAYS TO PERMANENT THREADS

— IN ANY MATERIAL!

For original design — production salvage and "on-the-job" thread repairs — use *Heli-Coil* Stainless Steel Wire Screw Thread Inserts.

HELI-COIL Standard Insert
for stronger, smoother, lifetime threads

Permanently protects threads against wear, stripping, corrosion, galling, seizing, vibration, and shock. Made of 18-8 stainless steel wire, this precision-formed *Heli-Coil* Insert has a tensile strength of approximately 200,000 psi. Conforms to military standards and all commercial and industrial thread forms.

HELI-COIL Screw-Lock Insert
eliminates lock wiring and lock nuts

This one-piece wire Screw-Lock Insert provides all the thread protection of the Screw-Thread Insert, PLUS an exclusive resilient *internal* locking feature that eliminates clumsy protruding lock nuts, lock wiring and other supplementary locking devices. It saves cost, space and weight — permits simple streamlined design in standard bosses. Meets military and N.A.S. specifications for locking torque and vibration.

HELI-COIL Shop-pack
for all "on-the-job" thread repairs

Contains everything needed for fast, easy thread repair — *on the spot!* Salvage expensive parts — for pennies! Shop Pack restores threads to original size. Available in U.N.F. and U.N.C. sizes 6-32 to 1½-6. There's a kit for spark plug and pipe thread sizes, too. Each Shop Pack contains a supply of *Heli-Coil* Screw-Thread Inserts with special tap plus inserting tool.

There is a *complete* line of *Heli-Coil* products for every thread need: inserts, taps, tools and gages. Let us help with your design and application problems. Write today for complete information.

HELI-COIL CORPORATION
3103 Shelter Rock Lane, Danbury, Connecticut

3103

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way, 3-way and 4-way styles. Manual and mechanical operators range from knobs through lever, clevis, roller cam, over-riding roller cam, foot pedal, treadle and air operators. The valves are designed for pressures from 29" in HG vacuum to 250 psig.

One, two, and three way valves can be changed from normally closed to normally open by reversing the spools.

Hoffman Valves, Inc., 2360 W. Dorothy Lane, Dayton 39, Ohio.

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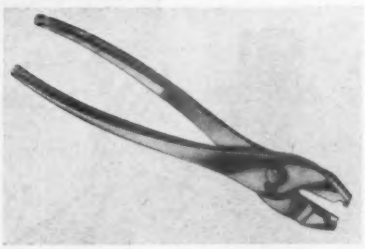
HOSE CLAMP PLIER HAS SLIP JOINT



The adjustable hose clamp plier No. 252 has been developed to handle the growing range of sizes of hose clamps in the automotive field.

The two gripping positions of the plier, combined with the slip-joint feature will accommodate a full range of spring clamps.

Proto Tool Co., 2201 Santa Fe Ave., Los Angeles 54, Calif.

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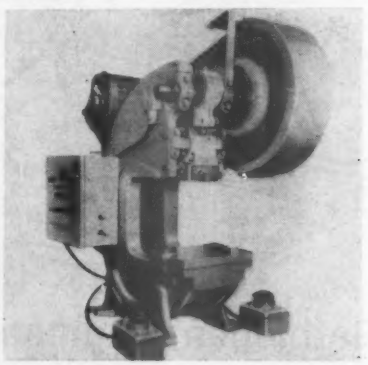
ASSEMBLY PRESS HAS ELECTRO-MAGNETIC CLUTCH



A positive electro-magnetic clutch is adaptable to all new as well as existing Benchmaster punch presses, with the exception of the one and two ton models. Mechanical linkage is eliminated and since no sliding keys normally used in mechanical clutches are required, breakage hazards from this source no longer exist.

Actuation lag is reduced, and pick-up occurs instantaneously over any portion of the flywheel rotation. Multiple press installations can also be automated with a single program.

Benchmaster Manufacturing Co., 1835 W. Rosecrans Ave., Gardena, Calif.

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TOOL MAKES SOLDERLESS CONNECTIONS MANUALLY

Performing the same quality solderless terminal connections as electrical and air-powered Wire-Wrap tools, the 14 H model manual tool provides up to 10 revolutions each time the handle is squeezed.

The 11½ oz instrument may be used with 22 to 26 ga wire sizes.

A cutting and skinning attachment is available for stripping and cutting wire to the right length.

Gardner-Denver Co., 100 Williamson St., Quincy, Ill.

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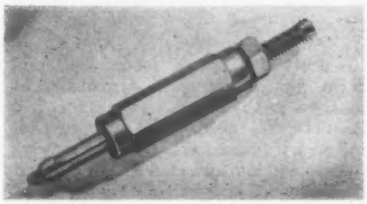
SHEET METAL CLAMP ALIGNS HOLES FOR RIVETING



Precision hole alignment and greater gripping power in holding sheet metal during riveting and welding operations are provided by a sheet metal clamp. This temporary fastener eliminates the wedge-type action of conventional clamps.

The WNHL-SD Clamp gives four-point alignment throughout its entire length. It is available in size ranges for holes up to ¼" and for material 1" thick.

Monogram Precision Industries, Inc., 8533 Higuera St., Culver City, Calif.

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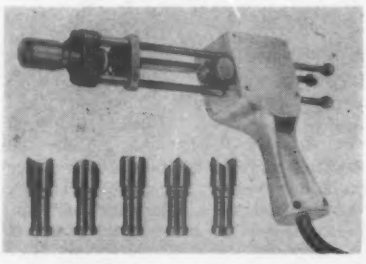
ELECTRIC ARC GUN WELDS, CUTS, AND RIVETS



An electric arc gun serves as a spot-welder, stud-welder, tack welder, button welder, hole burner and riveter.

HOW TO SAVE MONEY BY RIVETING

Design for rivets. Use their adaptability not only for assembly, but for electrical contacts, pivots, inserts in molded materials, fastening a number of parts in one operation, joining metallic and nonmetallic parts together, or to each other.

Plan on **high speed assembly**. Riveting is a high speed operation, and even manually operated machines include automatic hoppers. The uniform quality and strength of Milford semi-tubular, tubular, split or compression rivets permits the use of high speed production equipment by unskilled operators.

Count on a **positive** joint. A riveted joint can be visually inspected, an advantage not to be overlooked when compared to many other methods of fastening.

Use Milford's "five plant" facilities. Each Milford plant is strategically located to serve the important industrial areas of the U.S. **Order** and **get** Milford Products **when** and **where** you need them.

Have **uninterrupted production** with Milford rivet-setting machines. Used singly, or in economical "multiples", where you set more than one rivet with no increase in labor or handling costs, Milford riveters, setting Milford rivets, are the surest way to lowest in-place assembly cost.

THE MILFORD RIVET

MILFORD RIVET & MACHINE CO.

MILFORD, CONNECTICUT • HATBORO, PENNSYLVANIA
ELYRIA, OHIO • AURORA, ILLINOIS • NORWALK, CALIF.

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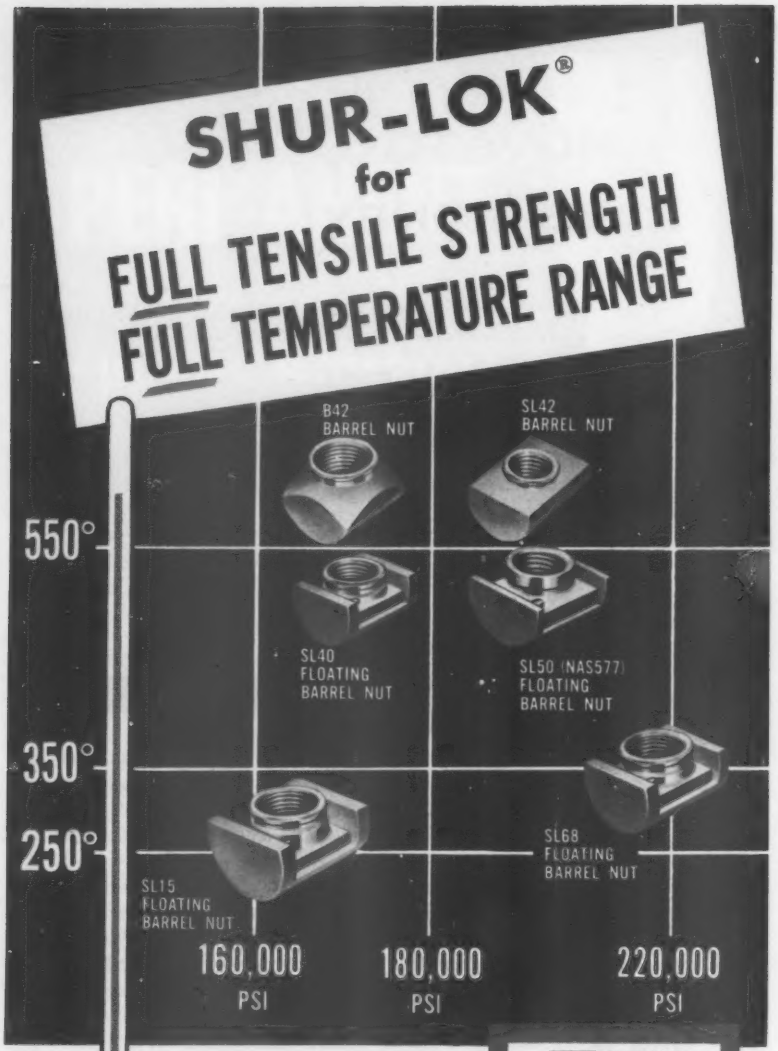
SHUR-LOK®
for
FULL TENSILE STRENGTH
FULL TEMPERATURE RANGE



THE ONLY FASTENERS WITH THE *EXCLUSIVE* SHUR-LOK® SELF-LOCKING FEATURE

Shur-Lok, pioneer of the floating barrel nut, now offers this unique line of high strength, high temperature nuts designed to meet the demanding requirements in supersonic aircraft and missile design. For lighter weights and greater strength, be sure you have the details on Shur-Lok fasteners. Write today.

SHUR-LOK® Corporation
879 S. East Street, Anaheim, California

Name _____
Title _____
Firm _____
Street _____
City _____ Zone _____ State _____
Please send me complete data on the following Shur-Lok Hi-Temp, Hi-Strength Nuts: _____
_____

OTHER SHUR-LOK STRUCTURAL FASTENERS

SL1172 Series Clinch Nut
Self-Locking 550°F

SL52 Series Flush Nut
Self-Locking 550°F

SL78 Honeycomb Insert
Lightweight Self-Locking

Use postpaid card. Circle No. 237

When connected to any welding machine power supply, the Beeco "Six Shooter" will burn a hole in two or more pieces of metal of any gauge or combination of gauges with a thickness up to ¼" on a single downward thrust of the gun.

Complete arc penetration may produce a hole, or a rivet as desired. A partial arc penetration may produce a stud, spot, tack or button weld, as required.

Beeco Manufacturing Corp., PO Box 116, Cranford, N.J.

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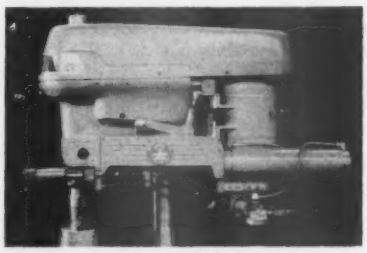
AIR POWERED DRILL PRESS FEEDS



Electrically and mechanically controlled air powered drill press feeds are designed with cast aluminum housing for the power transmission systems, which increases the rigidity and ruggedness of the unit.

Beckett drill press feeds are controlled by air valves, to provide rapid advance to the work, the correct drill point thrust, accurate depth control, and rapid withdrawal. Drilling-tapping models will tap direct from a standard drill chuck or multiple drill head, eliminating use of tapping heads, clutches and leadscrews.

Beckett-Harcum Co., 985 W. Locust St., Wilmington, Ohio.

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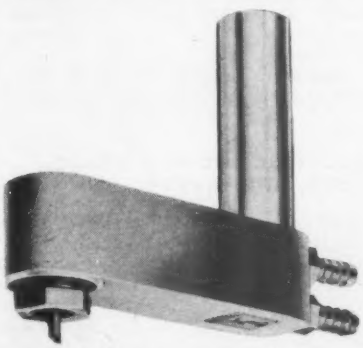
ALUMINUM WELDING TIP HOLDER RESISTS CORROSION



An all-aluminum offset spot welding tip holder made by use of a new extrusion method is lightweight, corrosion resistant, and is made with threaded tip adapters.

The adapters carrying the brunt of the holder wear, are easily replaced.

Holders come in standard 2" and

4" offset, with shank diameters from ¾" to 1½".

Air Reduction Sales Co., 150 E. 42 Street, New York 17, N.Y.

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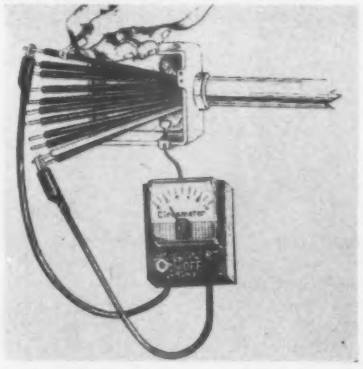
WIRE TRACER FOR USE BY ELECTRICAL INSPECTORS



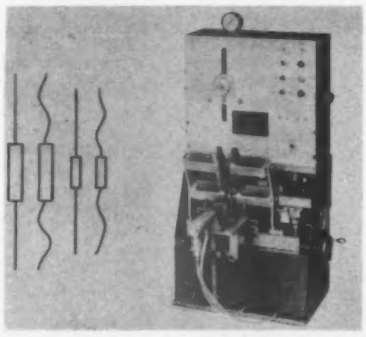
Identifying wires in conduit raceways and continuity testing with the Circameter eliminates errors and facilitates testing of wires to meet blue-print specifications in production or maintenance.

The unit can also be used in continuity testing with an ohm scale, 0 to 100,000 ohms, and in research and development projects where continuous testing of wires, cables and harnesses are required.

Products for Industry, 220 S. Rose St., Los Angeles 54, Calif.

Use postpaid card. Circle No. 27

LEAD STRAIGHTENER HANDLES 3000 PARTS AN HR.



An automatic component preparation machine straightens both leads and aligns them with the body of components.

The Auto-straightener model, AUS, handles all size bodies and straightens leads at 3000 or more parts per hour depending upon the method of feeding.

A major feature of the straightener is its ability to handle short run production also.

Only four adjustments are required to reset the machine to handle another body size.

Design Tool Co., 1055 Stewart Ave., Garden City, Long Island, N.Y.

Use postpaid card. Circle No. 28

Victor E. Clarke, Vice-President and Chief Engineer at Gables Engineering, Inc., holds tiny Bristol Multiple-Spline set screw, one of those used in 22 locations in tape reproducer (right) —including six in the vital, synchronous-motor-driven capstan assembly.

Bristol's Multiple-Spline socket screws help make music on the jet airlines

If you've traveled by jet recently, chances are that tape-recorded soft music and special announcements greeted you as you boarded the plane.

Chances are good, too, that they were played on a Model G-825 Tape Reproducer, manufactured by Gables Engineering, Inc., Coral Gables, Florida and supplied to the fleets of 20 leading U.S. and foreign air carriers.

Bristol Multiple-Spline socket screws, selected for their reliable holding power and easy assembly, are used in 22 locations in the G-825. "... Our uncompromising standards of quality," says Gables Vice-President and Chief Engineer Victor E. Clarke, "do not permit even the slightest risk of fastenings working loose as a result of stress or vibration in flight. Along with reliability, the Bristol screws provide simplicity of installation which contributes substantially to fast assembly ..."

These remarks are typical of the good word received from users of Bristol-originated Multiple-Spline socket screws. A few others: Can be wrenched up tighter ... holds better under shock and vibration ... socket doesn't round out ... can be loosened and tightened more times.

Bristol socket screws, with industry standard hex as well as Multiple-Spline sockets, come in a complete line from No. 0 ASA gauge to 1½". Set and cap screw types, including flat-head and button-head types, are available. Order them from your authorized Bristol Socket Screw Distributor. He carries a large selection in stock for immediate delivery and can help you select the *right* screw for your application. A.O.9

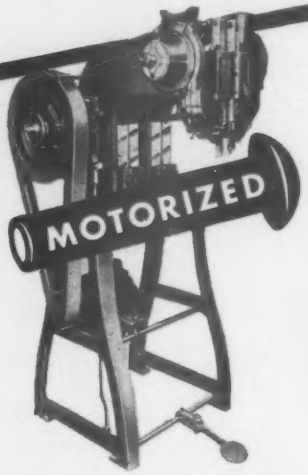
ACCO

Precision socket screws since 1913 ... by the makers of famous Bristol Precision Instruments
Bristol's Hex Socket Screws
Bristol's Multiple-Spline Socket Screws
*Made in sizes as small as No. 0 in Alloy Steel and Stainless Steel. Cap screws up to 1½" diameter.
THE BRISTOL COMPANY
Socket Screw Division
Waterbury 20, Conn.
A SUBSIDIARY OF AMERICAN CHAIN & CABLE COMPANY, INC.

Use postpaid card. Circle No. 238

Why *Chicago Rivet* Offers TWO METHODS for Clinching Semi-Tubular Rivets

It is part of a widening service based upon industry's recognition that an assembly held together by semi-tubular rivets has great inherent strength and is usually lowest in production cost.



The Chicago Rivet MOTORIZED AUTOMATIC RIVET SETTER produces a sharp, solid blow that immediately upsets the tubular section. This method is used on 95% of all applications involving metals or non-fragile materials.

The Chicago Rivet AIRPOWERED RIVETER produces a cushioned, shock-free clinch on a tubular rivet, permitting riveting of fragile and uneven materials. This method has greatly widened the use of semi-tubular rivets.

FOR YOUR FILES

RIVET CATALOG describes 1388 standard tubular and split rivets and 25 single and multiple motorized automatic rivet setters.

AIR-POWERED RIVETING catalog contains description and specifications of 8 single and multiple riveters—also rivet setters designed for automated operation.

Why not let Chicago Rivet Fastening Engineers tell you which system is best for you. No obligation.

MOTORIZED

Line includes automatic single, multiple and automated setters.

AIR-POWERED

Line includes automatic single, multiple and automated setters.

Chicago Rivet
& MACHINE CO.
946 So. 25th Ave., Bellwood, Ill.
(Chicago Suburb) Branch Factory:
Tyrone, Pa.

Use postpaid card. Circle No. 239

PORTABLE WORK CENTER HAS STORAGE FACILITIES

A series of benches, 30" wide and 28" deep is ideal where a portable work surface combined with storage space is required. Units are available with drawers, or with door cabinets.

All drawers are mounted on nylon rollers with latches and padlock attachments as standard equipment. Tops are 12 gauge steel, with a tempered masonite surface as optional covering.

Equipto, John and Prairie Sts., Aurora, Ill.

Use postpaid card. Circle No. 29

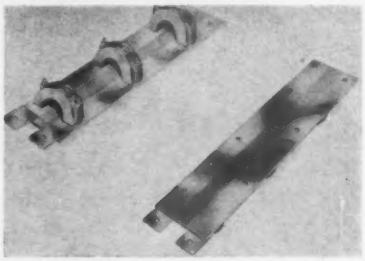
SPOT WELDER ACCESSORY IMPROVES CONTROL OF UNIT

Taking the weight off the operator's hands and functioning equally well from boom and counterweight or spring-loaded cable, the gyro bail equipped spot welder instantly adjusts itself for any angle of approach and use, with a minimum of effort.

J. G. Waldron, Miller Electric Mfg. Co., 781 Bounds St., Appleton, Wis.

Use postpaid card. Circle No. 51

MAGNETIC CONVEYOR SECTIONS AVAILABLE



A supplier of magnetic conveyors is making available magnetic bed sections for those companies that prefer to design and build completed units in their own shops.

Magniveyor sections are available in standard increments; single, double, and triple widths; with connecting curved transition pieces for direction change. The units are used to convey cans, metal parts and fixtures horizontally, vertically, and at all angles.

The sections are readily adapted to automated systems.

Magnetic Engineering and Manufacturing Co., 840 Van Houten Ave., Clifton, N.J.

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assembly and fastener engineering

MARCH, 1961
(Not valid after May 31, 1961)

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ADHESIVE APPLICATOR HAS PUSH BUTTON CONTROL

An adhesive applicator with a push-button control on the brush barrel for instantaneous adhesive flow, feeds solvent and water-based adhesives through a flexible hose directly into the brush under air pressure.

The unit includes a pressure tank which dispenses adhesives of average viscosity at 20 lbs pressure, and has an air regulator which allows setting at any desired pressure. Tanks of two and five gallon capacity are available.

Three outlets on the tank permit up to three operators to work from one unit.

Bostik Adhesives, B. B. Chemical Co., 784 Memorial Drive, Cambridge 39, Massachusetts.

Use postpaid card. Circle No. 24

VIBRATORY PARTS FEEDER HAS VARIABLE CONTROL

Instantaneous rate of flow for oriented position feeding is one of the improvements of a vibratory parts feeder. An electric variable control provides a nominal flow regulation, and a continuous range of feed regulations to make it correspond to the best capacity of automatic assembly equipment.

Elk Engineering Works, St. Marys, Pennsylvania.

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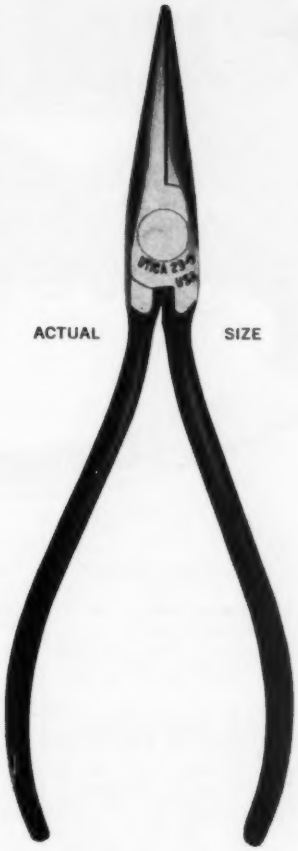
UTICA



ACTUAL SIZE

NEW MIDGET CHAIN NOSE!

Specially designed for delicate electronic subminiature assembly, this new Utica plier is the first tool of its size and kind. Developed at the request of professionals in the electronic industry, it's a precision instrument offering the thinnest nose possible consistent with good tool design. Strong, well balanced, finely finished, it's available in 4″, 4½″ and 5″ sizes. Call your Utica distributor or write for complete information.

Utica Drop Forge & Tool Division, Kelsey-Hayes Company, Utica 4, N. Y.

tools the experts use!

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t②tal retaining ring ideas

to help you cut costs—improve product design and performance

CircOlox

the newly designed, precision die-formed retaining ring—available in a variety of materials and finishes—from .040" and up in popular shaft increments.

EXTERNAL TYPE
—for axial installation
Specifically designed for NAS 670 standard grooves. Termed the CS Series, stocked in all popular sizes.

INTERNAL TYPE
—for axial installation
Specifically designed for NAS 669 standard grooves. Termed the CR Series, stocked in all popular sizes.

EXTERNAL TYPE
—for radial installation
Provides unusually large shoulder for small shafts—termed the CE Series, stocked in all popular sizes.

EXTERNAL TYPE—for radial installations involving high thrust
Provides double the thrust capacity of standard "E" rings (CE) with comparable large shoulder.

SPECIAL RING SHAPES
—engineered to your requirements
Ramsey engineers will be glad to work with you on the design of special ring shapes to meet your individual needs.

STACKED RINGS
—for rapid assembly
All CE Series rings from 1/8" to 3/4" can be supplied stacked on hardened rods for assembly line operations.

SPECIAL THICKNESSES
—heavier or lighter than standard
Rings heavier or lighter than standard thicknesses can generally be supplied on special order.

SPECIAL MATERIALS AND FINISHES
A wide variety of special materials, finishes and platings are available to meet practically any requirement. Ramsey engineers will help you select the type best suited to your needs.

MATERIAL	FINISH
Spring Steel,	Cadmium Plate
Stainless Steel	Parkerized
Phosphor Bronze	Blued Steel
Beryllium Copper	Black Oxide
	Lubrite Finish

Ramsey's special finish technique eliminates burrs and scale for maximum performance. Precision design eliminates bevelling or waviness in the ring. Tapered section design permits maximum conformability. Ring grip is not adversely affected by expansion or contraction within the allowable limits. Together with the complete selection of materials and finishes. Circolox gives you unlimited opportunities to cut costs and improve product design and performance. Circolox rings meet all industry and government standards.

SpirOlox

or—you may find the answer in

the unique 360° spiral-wound retaining ring

This exclusive full-round retaining ring is mass produced on high speed rollers in a practically unlimited range of sizes. Prototypes can be made without need for tooling. Sizes made from .375" up to 48" and in many varieties, such as single turn, multi-turn, self-locking, resilient take-up, etc. Check these outstanding features:

- Uniform wall allows installation with minimum clearance.
- Two-turn, full-circle design eliminates gaps.
- No special tools needed for installation or removal.
- Special deep groove design withstands greatly increased thrust loads.
- Covered by Government Specification MIL-R-27426.

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this FREE engineering manual brings you the complete tOtal 2 story!

Contains full descriptions of Circolox and Spirolox Rings with complete design information and specifications. Write TODAY!

manufactured by

RAMSEY CORPORATION *a subsidiary of* ***Thompson Ramo Wooldridge Inc.***

Box 513, Dept. U, St. Louis 66, Mo.

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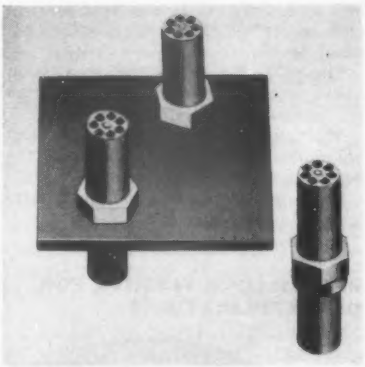
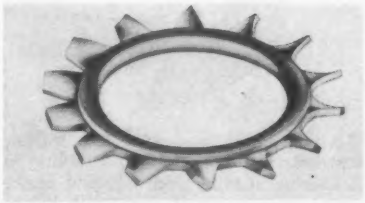
WHAT'S NEW IN FASTENING AND JOINING

For further information on any of the fasteners or methods use the handy postpaid card opposite page 58.



(See No. 30)



(See No. 31)

(See No. 32)

COMPONENT CONNECTORS FOR MINIATURE ASSEMBLIES

Insulated feedthru and standoff component connectors offering high tie-point density in extremely small size area are designed for miniature assemblies.

A connector .25" high off the board, and .190" in outside diameter holds 7 micro-miniature sockets equally spaced on a .120" diameter circle.

Whole circuits can be switched around in characteristic or operational function, without soldering.

The unit accepts wires of .010" to .022" diameters. Both the standoff and feedthru connectors are fastened to the board by simple staking methods.

Omega Precision, Inc., 757 N. Coney Ave., Azusa, Calif.

Use postpaid card. Circle No. 30

HIGH TORQUE APPLICATIONS FOR RIM LOCK WASHER

A folded rim lock washer has a double strength rim to meet the requirements of assembly work involving high torques and tensions. It can also be used in sealing applications to eliminate thread leakage under high pressures and temperatures as high as 500° F.

A full line to match screw sizes from 5/16" to 5/8" is available.

Shakeproof Division, Illinois Tool Works, St. Charles Rd., Elgin, Ill.

Use postpaid card. Circle No. 31

SILVER BRAZING FLUX HAS UNLIMITED SHELF LIFE

A micro-ground, production silver-brazing flux for torch, furnace or induction brazing of stainless steel, nickel alloys, copper, brass, bronze, steel, and all silver alloys has unlimited shelf life.

The flux, S-200 Brazaloy, indicates working temperatures by boiling at 212° F, dissolving metal oxides between 600° and 800° F and by becoming transparent at 1100° F. Its active range is between 600° and 1800° F.

The flux is recommended when tight joints necessitate capillary flow and in production brazing operations. It cleans off with hot water.

All-State Welding Alloys Co., Inc., 249 Ferris Ave., White Plains, N.Y.

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HEAT-SINK PADS AID TRANSISTOR SOLDERING

Using the principle of evaporating fluid to absorb heat, transfer temperatures are kept from rising to dangerous levels during hand soldering operations.

Felt pads, pierced with holes for transistor leads and sandwiched between the semi-conductor and circuit board, are injected with a volatile fluid which evaporates during the soldering operations.

If it should become desirable to change a transistor, the felt pad is flexible enough to permit one lead to be removed at a time, and the fluid again prevents injury to the transistor.

Navigation Computer Corp., 1621 Snyder Ave., Philadelphia 45, Pa.

Use postpaid card. Circle No. 33

METAL SEAL FITTING HANDLES HIGH TEMP.

A metal sealing ring to use on straight thread fittings, where a conventional synthetic rubber o-ring with back-up washer is not acceptable is designed to work in the standard SAE o-ring fitting boss, providing a metal-to-metal seating for a highly satisfactory seal.

Made of type 304 stainless steel, the metal ring answers problems in handling high temperatures and rubber-attacking fluids as well as high pressures.

It can be provided on straight thread steel and stainless steel triple-lok flared tube fittings, adapter fittings, and reusable fittings for industrial hose. It cannot be removed from the fitting and therefore cannot be lost.

Eastman 910 Adhesive solves another production bottleneck

Hubley Manufacturing Company, of Lancaster, Pa., makes the Ric-O-Shay Pistol, a toy gun that simulates the whine of a ricochetting bullet.

The sound is generated by a bent musical wire vibrating against a thin brass percussion plate.

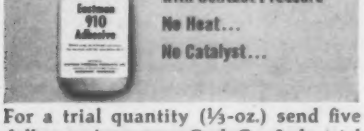
An L-shaped zinc alloy slug, die-cast onto the end of the wire, must be properly positioned and rigidly mounted in the percussion plate rim to obtain a realistic sound. Several fastening techniques were tried, with limited success. The high-strength bond and simple application of quick-setting Eastman 910 Adhesive solved the bottleneck.

Use of this adhesive produced a bond with the high resistance to vibration necessary for long service life.

Eastman 910 Adhesive is making possible faster, more economical assembly-line operations and new design approaches for many products. It is ideal where extreme speed of setting is important, or where design requirements involve joining small surfaces, complex mechanical fasteners or heat-sensitive elements.

Eastman 910 Adhesive is used as it comes. No mixing, no heating. Simply spread the adhesive into a thin film between two surfaces. Light manual pressure triggers setting. With most materials, strong bonds are made within minutes.

What production or design problem can this unique adhesive solve for you?



For a trial quantity (⅓-oz.) send five dollars to Armstrong Cork Co., Industrial Adhesives Div., 9107 Dean Street, Lancaster, Pa., or to Eastman Chemical Products, Inc., Chemicals Div., Dept. A-3, Kingsport, Tenn. (Not for drug use)

See Sweet's 1960 Prod. Des. File, 7/E

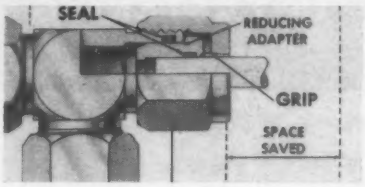
Use postpaid card. Circle No. 242

It can be used again and again without damage to itself or to the boss.

Parker Fittings & Hose Div., Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio.

Use postpaid card. Circle No. 34

INTERNAL REDUCER BUSHING SHORTENS OVER-ALL LENGTH



Utilizing a separate, non-damaging collet grip and O-ring seal, a tube reducing adapter shortens the over-all length required with typical standard reducers.

The reducer bushing is internal, making possible a reduction in over-all length.

Ranging in size from 2" x 1½" down to ⅜" x ¼" standard, the reducers are also available in stainless steel.

The Lenz Company, 3301 Klepinger Rd., Dayton 1, Ohio.

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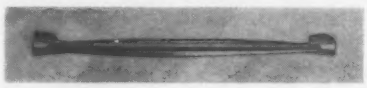
DIE CAST APPLIANCE HANDLE HAS MANY APPLICATIONS



A die cast handle for use in the appliance industry measures 14" over-all, with 13" hole centers.

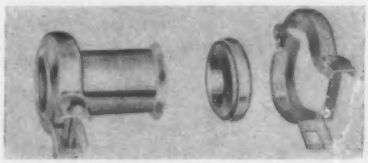
Its design, length and finger room also make it suitable for many other applications.

The 59-1132 handle is available in bright chrome alone, or a combination of bright chrome with a baked enamel color.

National Lock Co., 1902 7th St., Rockford, Illinois.

Use postpaid card. Circle No. 36

BREAKAWAY COUPLING IN WIDE SIZE RANGE



Pipe coupling is now available in a range of standard pipe sizes from ⅜" to 4" and in lengths from 2" through 36".

Designed to join plain pipe ends quickly and easily without cutting or threading the pipe, the Flexmaster absorbs pipe vibration and shock and is corrosion resistant. It allows up to 4° angular misalignment and permits both angular and axial pipe movement without leakage.

The coupling fastens with only one nut and bolt on each coupling end, making it particularly suited for quick-breakaway connections.

It meets ASA requirements for 150 lbs service with temperatures from minus 40° F to plus 250° F.

Aeroquip Corporation, Marman Division, 11214 Exposition Boulevard, Los Angeles 64, Calif.

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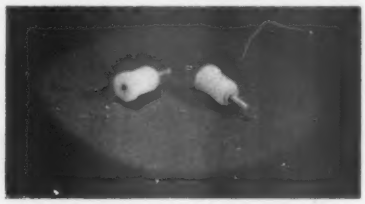
CLOSED ENTRY TEST JACK WITH STUD TERMINAL



A test jack, providing closed entry and stud terminal is designed for use with a .032" diameter by .200" maximum probe.

The SKT-37 test jack utilizes a teflon body, machined for a fast, easy, press fit, permanent installation.

The closed entry assures perfect alignment of the test probe with the beryllium copper contacts.

Sealectro Corporation, 610 Fayette Ave., Mamaroneck, N.Y.

Use postpaid card. Circle No. 38

SPRING LOCK WASHER FOR OEM APPLICATIONS

A non-entangling spring lock washer features angle cut ends, enabling a deeper embedding and engaging of the nut, screw or bolt face and bolted surface.

The washer is suitable for general use and application on all types of automotive, farm implement, electrical and industrial equipment.

Eaton Manufacturing Co., Reliance Division, 602 Charles Ave., Massillon, Ohio.

Use postpaid card. Circle No. 39

ZINC PLATING BRIGHTENER FOR RECESSES AND THREADS

A liquid brightener for zinc plating baths is a free flowing liquid that may be added directly to plating baths without prior dilution.

Zinc Brightener 25 is useful for applying a uniformly bright zinc plate to low-current-density areas such as recesses and threads.

Metal & Thermit Corp., Rahway, N.J.

Use postpaid card. Circle No. 40

FASTENOMICS

TIPS ON FASTENER APPLICATIONS BY STANSCREW

Socket Screw Standards Changed

Check Dimensional Revisions Now to Avoid Extra Costs

Important changes are now in progress in the socket screw industry. Every user should know the details and take appropriate action to avoid higher costs in the future. As a public service, Stanscrew is issuing this progress report.

New Standards Adopted

Exhaustive industry-wide studies, begun in 1954, culminated in 1959 with the adoption of new dimensional standards for socket head cap screws. Standard Screw participated in these studies and concurred in industry recommendations. The new standards, known as the "1960 Series", include changes in head diameters, socket sizes, and thread lengths.

Advantages of New Design

The "1960 Series" has been carefully engineered so there is functional uniformity for all sizes, particularly as applied to wrenching areas and to the relationship of head diameters to body diameters. It offers these important advantages over the previous design, known as the "1936 Series":

1. Larger wrenching area permits applications of clamping force . . . provides maximum utilization of fastener's inherent strength.
2. Provides increased bearing surface under the head . . . up to 233⅓% more.
3. Minimum indentation . . . particularly important with softer metals.

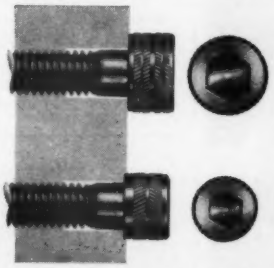
What's Available When

When the "1960 Series" was announced in 1959, it was believed it would become the only standard as of Jan. 1, 1961 and, thereafter, all "1936 Series" would be available only on special order. As previously announced, all sizes in the "1960 Series" are being supplied as standard. However, to make the transition as easy as possible, Stanscrew and other leading producers have extended the changeover period for certain sizes of the "1936 Series".

These are the sizes . . . 5/16", 7/16", 5/8", 3/4", 7/8" and 1" . . . for which the new standards include a change both in head diameter and socket width across flats. Until Jan. 1, 1963 both the "1936 Series" and "1960 Series" will be considered standard in these six sizes.

For all sizes, however, thread lengths are now being manufactured to "1960" standards. Once current inventories are depleted, "1936 Series" thread lengths will be available on special order only. Based on exhaustive surveys, this will prove no problem in the overwhelming majority of applications.

In some sizes . . . #1, #2, #4, #6, and #8 . . . head diameters are the same, but there has been a change in the socket width. In these sizes, current production is to "1960 Series" dimensions. These sizes are also available in the "1936 Series" until present stocks are depleted, but thereafter only on special order.



Change In Your Designs Essential

This industry program makes it essential that you review product designs to avoid future difficulties. All products now on your drawing boards should incorporate the "1960 Series" socket cap screws wherever possible. And, during the next two years, it is recommended you take advantage of model changes or other opportunities to change existing applications of the "1936 Series" to the "1960" standards. Failure to make provisions could result in procurement difficulties or the higher costs of non-standard items.

Complete Design Information Available

Stanscrew has prepared an up-to-date brochure giving complete information on all steps in this important transition, together with complete design data on both the "1960" and "1936 Series". You can obtain your copy through your local Stanscrew distributor. Call him today.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

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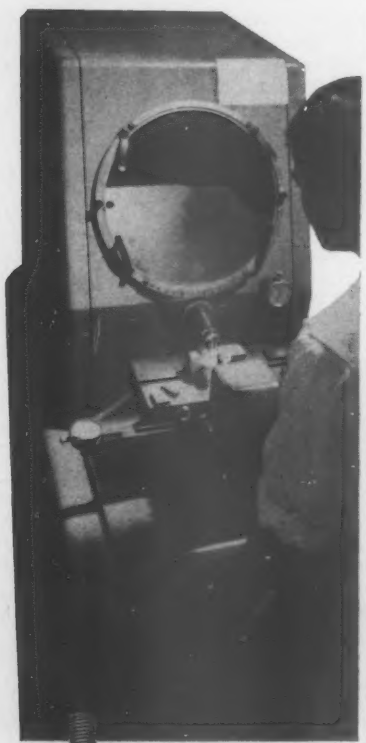
FASTENER RELIABILITY

AIC has the most modern **Quality Control** and **Metallurgical Laboratory** in the Fastener Field. Rigid **Quality Control Inspection** in each and every phase of manufacturing assures AIC Customers Reliable Fasteners.



Write for complete illustrated brochure.

AIR INDUSTRIES OF CALIFORNIA

aic

1559 WEST 134TH STREET, GARDENA, CALIFORNIA

Manufacturers of Precision Fasteners for Aircraft, Electronics, Missile Industries

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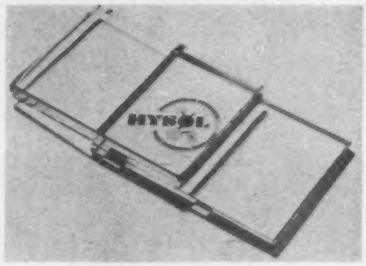
CLEAR EPOXY ADHESIVE FOR PRINTED CIRCUIT REPAIR



A room temperature cure Epoxi-Patch kit, No. 0151, is packaged in flexible tubes for greater handling ease.

The kit is recommended for repair of printed circuits, strain gauges and similar applications.

It can also be used to bond glass-to-glass, pyroceram-to-glass, and metal-to-glass.

Hysol Corporation, 322 Houghton Ave., Olean, N.Y.

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SEMICONDUCTOR ALLOY KIT FOR RESEARCH WORK

A semiconductor alloy kit contains over 25000 semiconductor preforms, including the latest alloys used in the industry.

Kit Z-100 includes new clad metals, such as indium-clad-aluminum. The semiconductor preforms included are a complete range of usable forms, such as discs, washers and spheres.

It also contains 24 different alloys for use in both germanium and silicon diodes, rectifiers, and transistors. Other alloys include tin-antimony, lead-silver, indium-germanium, tin-lead-antimony and aluminum-boron.

The kit is priced at $100.00.

Accurate Specialties Company, Inc., 345 Lodi St., Hackensack, N.J.

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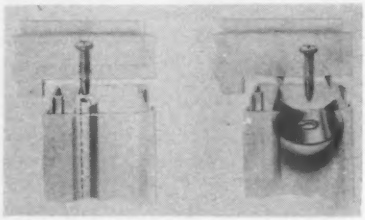
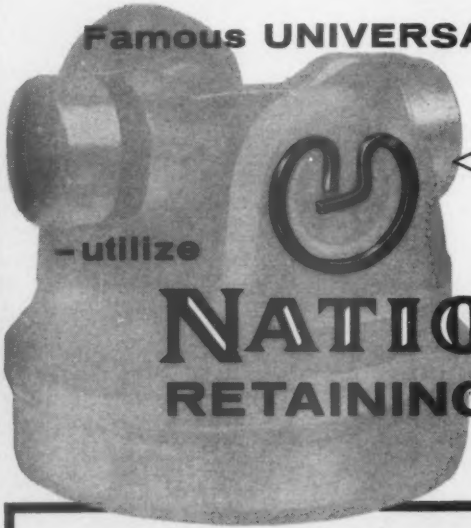
SPRING FASTENER JOINS ALUMINUM CHANNELS



Originally designed for aluminum window frame assembly, an aluminum spring fastener has wide applications wherever such fasteners are required.

The Channeloc consists of a rectangular dish-shaped aluminum spring fastener, with two square edges which bite into the aluminum channel when

Famous UNIVERSAL JOINTS



Spicer

-utilize

NATIONAL

RETAINING RINGS

FOLLOW THE LEADERS! Simplify product designs, reduce weight, space and production operations by installing NATIONAL Retaining rings. Use smaller shafts and housings, save machining and material wasted when larger shafts are cut down to make shoulders. Performance-proven on assemblies ranging from heavy machinery to electronic equipment. Request catalog and recommendations on your specific applications.

The NATIONAL LOCK WASHER COMPANY

Serving Industry Since 1886

NEWARK 5, NEW JERSEY • MILWAUKEE 2, WISCONSIN

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compressed. It is hardened for optimum resiliency.

George K. Garrett Company, Inc., Torresdale Ave., at Tolbut St., Philadelphia 36, Pa.

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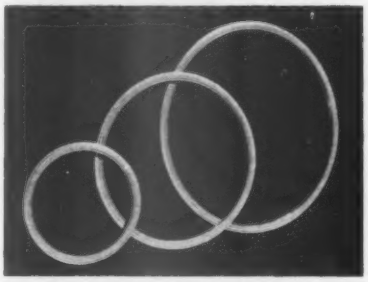
SEALS MACHINE-FINISHED FLANGES UP TO 5000 PSI



A pressure-actuated seal for low and high-pressure applications requires only normal machined finishes on mating flange and component surfaces.

Pneuflex Seal has been designed specifically to meet the high-pressure and extreme-temperature requirements of system components in missiles and high-performance aircraft; with temperatures ranging from minus 450° F to plus 500° F at pressures up to 5000 psi.

The seal is a flexible metallic ring with protruding sealing edges coated with a soft resilient material. Its spring load forces the soft coating to flow into minute scratches and irregularities on the mating surfaces of the flange or component.

Del Manufacturing, Arrowhead-Puritas Waters Inc., 1584 E. 20th St., Los Angeles, Calif.

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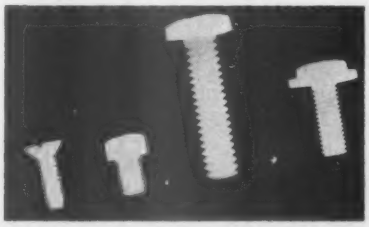
NYLON MOLDED SCREWS HAVE HIGH TENSILE STRENGTH



Using an injection molding technique, fasteners are molded of engineering thermoplastics to precise tolerance and exacting specifications in a single automatic operation.

GRC Delrin screws possess excellent electrical insulation properties, unusually high tensile strength, rigidity and resistance to deformation, and high

FASTENERS FOR AIRCRAFT AND MISSILES
Immediate Delivery—AN—N.A.S.—M.S.—8 Digit
CERTIFIED TO GOVERNMENT SPECIFICATIONS
Bolts—Nuts—Rivets—Screws—Studs—Internal and External Wrenching Bolts—Dowel and Lock Pins
Mercury air parts co., inc.
9310 West Jefferson Blvd., Culver City, Calif.
Telephone—UPton 0-5923—Teletype—CVR CY 4138
TOUGH SPECIALS 10 DAY DELIVERY
MANUFACTURERS OF PRECISION HARDWARE

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Booster shot...

FOR "TIRED" ASSEMBLY AND FASTENING OPERATIONS

When production schedules sag and assembly problems give you a persistent headache . . . it's time to turn to Fischer for precision turned brass and aluminum nuts. Fischer produces standards, specials and miniatures in O.D. sizes from ⅛" to 1⅛" . . . with tolerances on lengths and diameters held to +.000" and —.005" . . . combined with special thread diameters from No. "0" to ¾". The nuts pictured at left illustrate the wide range of Fischer's capabilities. Regardless of your requirements, you can depend on Fischer for premium quality nuts at competitive prices.

there's no premium for precision at Fischer

Write today for Catalog FS-1000.

FISCHER SPECIAL MFG. CO.
496 Morgan Street • Cincinnati 6, Ohio

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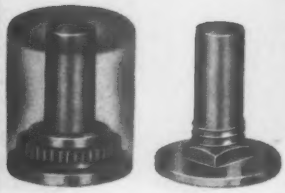
A SAVING OF OVER $40.00 per thousand pieces



MILLED FROM BAR COLD HEADED

thanks to COLD HEADING by CLARK

THE PROBLEM:
Cut costs on a special fastener blank used as insert in plastic knob.

SPECIAL REQUIREMENTS:
Fastener must have surfaces that grip into plastic and hold fast when knob is pulled laterally or turned.

SOLUTION:
Redesign to simplify gripping surfaces. Production by Clark Cold Heading process (instead of machining from bar stock).

SAVINGS:
In steel ....$19.70 per 1 M pcs.
In labor, over 21.00 per 1 M pcs.
TOTAL, over $40.00 per 1 M pcs.

It's quite possible that Clark Cold Heading can effect equally impressive savings on *your* special fasteners.

Send sample (or blueprint) for prompt analysis and quotation *... at no obligation.*

CLARK BROS. BOLT CO. MILLDALE, CONN.

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dimensional stability over a wide range of environmental conditions.

The screws are available in six head types and six point types in headless set screws. Threads range from 0-80 to ½-20.

Gries Reproducer Corporation, 15 Second St., New Rochelle N.Y.

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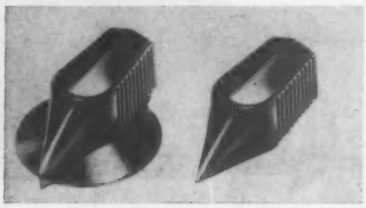
BAR POINTER KNOBS REDUCE PARALLAX



Parallax has been virtually eliminated in two bar-pointer knobs designed and built to military specification MIL-K-3926.

Available in black or gray, the two models have a ⅞" swept turning radius and are available in the 90 Series for ½" shafts.

Supplied with each knob are two-cup point, socket type set screws. A high-gloss mirror finish or a non-reflective matte finish is available in either color.

William Weed, Raytheon Company, Industrial Components Division, 55 Chapel St., Newton 58, Mass.

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THREAD LUBRICANT AND SEALER RESISTS GASES, OILS

Consisting of suspended metallic lead, a thread lubricant and sealer is impervious to gases, oils, fuels, air, water and steam.

Anti-Seize No. 609 can also be used for press fits, as a cable lubricant, hose connections and as a gasket sealant.

The compound has manufacturers' specifications and approval for 100,000 psi for hydraulic fluids.

Armite Laboratories, 6609 Broad St., Los Angeles 1, Calif.

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LIQUID SOLDER FLUX NOW AVAILABLE AS CORE SOLDER

Formerly available only in liquid form, Hydrazine Flux, has now been incorporated into core solder.

BEST WAY TO SEAL HOLES!
LEE PLUG
Simply place plug in reamed hole. Drive in tapered pin until ends are flush. Controlled expansion causes grooves to "bite" into casting, assures a bone dry seal that withstands pressures up to 40,000 psi. Now widely used on aircraft and missiles, and for pumps, servo valves, regulators, etc.
*Pat. #2,821,323
LEE COMPANY
OLD SAYBROOK, CONN.
WRITE TODAY FOR COMPLETE ENGINEERING DATA

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H-32 hydrazine activated core solder can be used in soldering all electrical and electronic equipment. In addition, it leaves no resin residue to support fungus growth, is non-corrosive, and non-hygroscopic. It vaporizes completely at soldering temperature.

Fairmount Chemical Co., 136 Liberty St., New York 6, N.Y.

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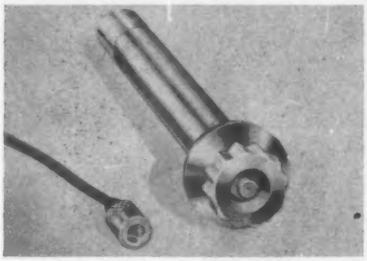
STRAIN-BOLT INDICATES OWN TENSION LOAD



Available in all external wrenching standard cap screw, hex head and 12-point super-strength bolt sizes, the Strainsert Bolt indicates bolt tension load with accuracy of better than 1%.

The bolt consists of strain gages installed in the neutral axis of the bolt shank, with a screw type connector embedded in the bolt head. Tightening loads or changes in bolt load due to vibration, shock, or wear may be observed or recorded remotely.

Strainsert Company, East Fourth St., Bridgeport, Pa.

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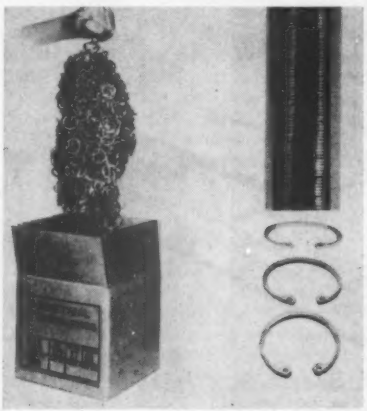
PRE-STACKED RINGS AID AUTOMATIC ASSEMBLY



Internal retaining rings now marketed in pre-stacked packages can speed automatic assembly operations.

The series 3000, for housing diameters 1/4" to 1-1/16", are pre-stacked with the lugs aligned.

Each package contains 250 pre-stacked rings, properly identified as to type and size.

Industrial Retaining Ring Co., 57 Cordier St., Irvington, N.J.

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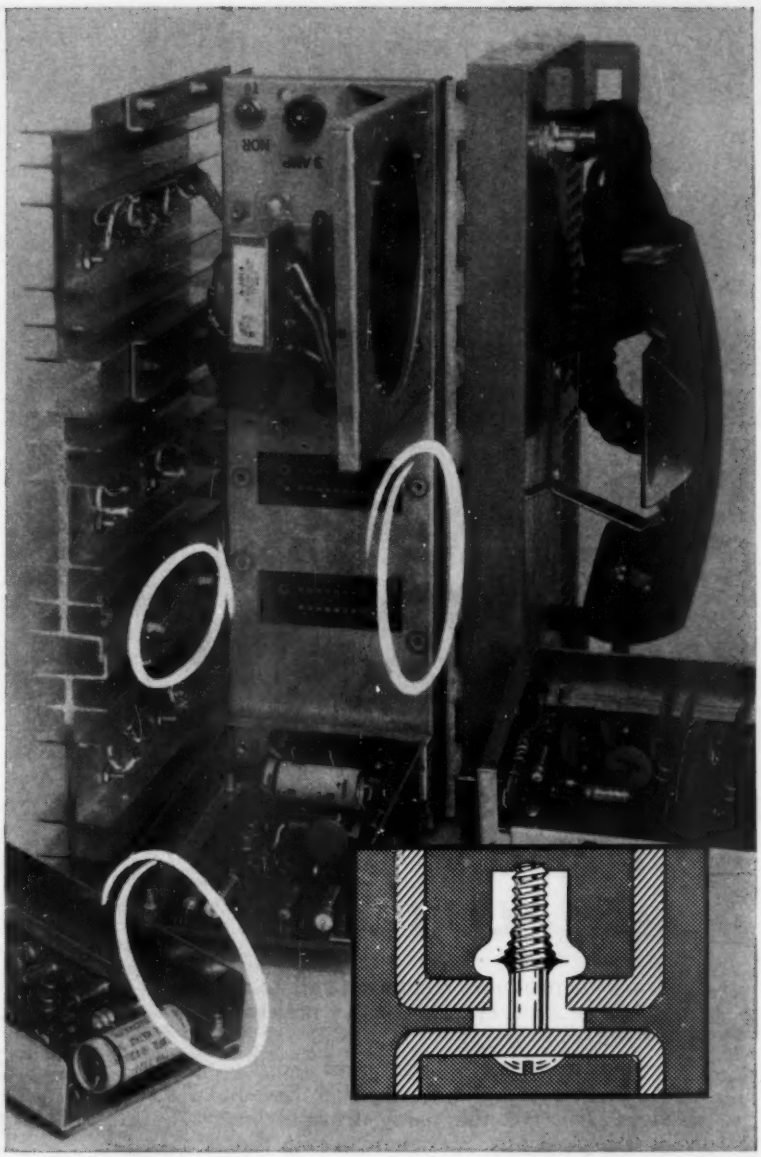

RIVNUT FASTENERS LICK VIBRATION PROBLEMS ON TRAIN TELEPHONES. These portable carrier telephones, used on rapid transit cars, have to withstand frequent handling and train vibration and shock. The rugged construction includes use of RIVNUTS for vibration-resistant fastening. The manufacturer, Femco, Inc., of Irwin, Pennsylvania, also cut costs with RIVNUTS by speeding up assembly of components. RIVNUTS are the only blind fasteners with internal threads—provide strong nutplates in thin-gage metal. For data booklet showing applications, sizes, and tool data, write Dept. AE-3, B.F.Goodrich Aviation Products, a division of The B.F.Goodrich Company, Akron, Ohio.

B.F.Goodrich RIVNUTS

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450* PIECES PER MINUTE!

NOT JUST SPEED ALONE ... BUT SPEED PLUS ...

accuracy of product, rigidity, good tool life, fewer and simple adjustments, lower maintenance!

Have you witnessed production runs of difficult-to-make parts on National High Speed Headers? Observe the many features in machine and tooling. Start now to gain the benefits of sustained production at the highest safe speeds ever achieved!

We welcome you to Tiffin for actual demonstrations and a thorough study of your cold heading requirements.

** 1/8-inch High Speed Cold Header 27,000 Parts Per Hour*

Ask to see our 16mm color sound film, "High Speed Cold Heading."

Founded 1874—DESIGNERS and BUILDERS of MODERN FORGING MACHINES • MAXIPRESSES • REDUCEROLLS • COLD HEADERS BOLTMAKERS • NUT FORMERS • TAPPERS • NAILMAKERS CO-PIONEERS WITH INDUSTRY OF ADVANCED METALWORKING PRODUCTION METHODS

HARTFORD DETROIT CHICAGO

NATIONAL MACHINERY CO.

TIFFIN, OHIO, U. S. A.

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USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 58.

TOOLING ACCESSORIES

Torque thumb screws, toggle pads and leveling pads are described in catalog No. 60. Included also are spring plungers, ball plungers, swivel pad clamps, with engineering drawings and specifications for the pads, screws, and clamps. Vlier Engineering Corp., 8900 Santa Monica Blvd., Los Angeles 46, California.

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FLAME CUTTING MACHINES

A complete line of flame-cutting machines ranging in size from small, portable machines to multi-torch shape-cutting units are described in 28-page catalog. Also included are complete specifications for each machine, illustrations of typical installations, and a description of a variety of machine accessories. Linde Company, 270 Park Ave., New York 17, N.Y.

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FASTENER SUPPLY SERVICE

Inventory and stock control are two of the services listed in eight-page booklet describing all the services offered by distributor and manufacturer of fasteners. Automotive Hardware Co., 7030 W. Roosevelt Rd., Oak Park, Ill.

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ROLLER CONVEYORS

Photographs and diagrams illustrated in eight-page brochure describe principles and features of wheel and live roller, adjustable pressure conveyors. Product information includes specifications on length, width, height, belt speed, load capacities and other details of construction. The Rapids-Standard Co., Inc., 342 Rapistan Bldg., Grand Rapids 2, Mich.

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LOCKNUT ANALYSIS

Brochure shows scientific evaluation by the University of Minnesota, through photoelastic analysis, holding power of special locknut. Klincher Locknut Inc., Dept. KLL-290, 2153 Hillside Ave., Indianapolis 18, Ind.

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FASTENER STRENGTH

Fundamental explanation of different kinds of strengths involved in metal bolts and nuts and how they are achieved is described in 14-page illustrated booklet. Shear, tensile and yield strength, elongation, cold working, stress corrosion, creep strength, thread strength and metal fatigue are all explained in non-technical language, aided by illustrative drawings. H. M. Harper Co., 8200 Lehigh Ave., Morton Grove, Ill.

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ELECTRONIC CONTROLS

Cutting the cost of welding through the use of electronic machine controls is discussed in twelve page pamphlet. Included also are photographic descriptions of controls made by the company, and a photographic tour of plant facilities. Weltronic Company, 19500 West Eight Mile Rd., Southfield, Mich.

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STRAIN BOLTS

Four page technical bulletin describes strain bolt capable of indicating continuously, tensile stress or load induced by either tightening or other loading, such as shock, vibration or wear. Included also are technical and electrical specifications as well as quantity prices. Strainsert Company, Fourth and Prospect, Bridgeport, Pa.

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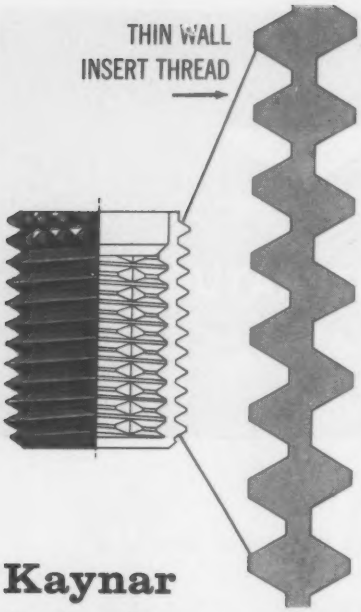
See No. 66

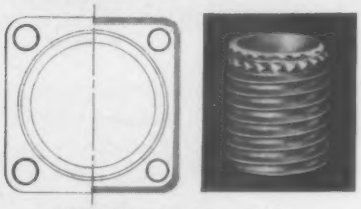
See No. 67

See No. 68



Kaynar introduces new thin wall insert

New, high strength Kaylock® Thin Wall Insert embodies a design concept that in most cases permits one-thread size differential, I.D. to O.D. This feature makes it possible to reduce boss diameter requirements to an absolute minimum and still develop in the casting high strength potentials. The new Kaylock Thin Wall Insert can be installed in space-critical areas in minimum diameter bosses. In the installed condition it is locked positively in place, assuring fastener integrity. The internal thread-locking feature assures retention of mating bolt per MIL-N-25027. One-piece design, stainless or alloy steel, adds strength to lightweight parent materials. Easily installed — no special taps or gages. WRITE TODAY for the new Kaylock Thin Wall Insert Brochure — or contact your nearest Kaynar representative.



SAVES SPACE — all holes prepared for inserts with same internal thread size

Kaylock®

first in lightweight locknuts

KAYNAR MFG. CO., INC., KAYLOCK DIVISION
Box 2001, Terminal Annex, Los Angeles 54, Calif.
Branch offices, warehouses & representatives in Wichita, Kan.; New York, N. Y.; Atlanta, Ga.; Renton, Wash.; Montreal; Paris; London; The Hague

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AEROSPACE BOLT GUIDE

Specification sketches, each keyed to a silhouette sketch, pinpoint basic information and identification of over 120 different aerospace bolts. Also included in the 24-page selection guide are numerical designation, fastener type, material, tensile strength or other strength rating, and temperature range. Standard Pressed Steel, Box 1121, Jenkintown, Pa.

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SCREW THREAD TEMPLATES

Eleven templates in the mechanical engineering field ranging from screw threads to gears and nuts and bolts are illustrated and described in template catalog No. 65. Also listed are electrical lettering, processing, architectural and specialized templates. RapiDesign Incorporated, P.O. Box 426, Burbank, California.

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THREAD ROLLING MACHINES

Four page brochure describes company's thread rolling machines, covering such applications as thread rolling, roll-forming, marking, serrating and necking of bolts, screws, nails and special parts in a variety of sizes. Prutton Corporation, 5305 W. 130th St., Cleveland 30, Ohio.

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TORQUE CONTROLS

Interchangeable torque bars, delivering torque control from six to ninety foot lbs, are described in two page folder. Included also are photographs, showing various uses of impact wrench and torque control bars. Ingersoll Rand, 11 Broadway, New York 4, N.Y.

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SPECIAL FASTENERS

Feature points of company's specialized fastener service are detailed in two-color, four-page brochure. Plant equipment and capacity are fully described and photographed. Included also is a chart containing 62 special fasteners, with descriptions and numbered for ready reference. Mid-America Fasteners, Inc., 10114 Pacific Ave., Franklin Park, Ill.

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RETAINING PIN WELDER

Welding gun for attaching insulation retaining pins to ductwork and similar applications is described in four page information folder. Included also are price lists for guns and accessories. Duro-Dyne Corporation, Route 110, Farmingdale, N.Y.

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FASTENER CATALOG

Complete line of bolts and nuts, cap and machine screws, washers, cotter pins, nails, escutcheon pins, rivets, etc., are listed in 28-page fastener catalog, CK-17. Included are fasteners of nickel, silicon, bronze, as well as other commonly used alloys. Chase Brass and Copper Co., 236 Grand St., Waterbury 20, Connecticut.

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THREAD CUTTING SCREWS

Technical folder gives most recent dimensions on hardened tapping and thread cutting screws. Also included are several tables giving recommended hole sizes for use of self tapping screws in a wide variety of materials, and illustrated chart which identifies at a glance, any type of thread cutting or tapping screw. Pioneer Screw & Nut Co., 2010 N. Ruby St., Melrose Park, Illinois.

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ALUMINUM LOCK NUTS

Aluminum self-locking nuts which afford higher temperature, strength-to-weight, and reusability performance with more accurate control are described in bulletins 3002 and 3003. Included also are charts of nut and thread sizes. Waltham Precision Instrument Co., 221 Crescent St., Waltham 54, Massachusetts.

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BRAZING FURNACES

High temperature box furnaces, designed for bright brazing, annealing, sintering and forging stainless steel, magnetic materials and molybdenum, are described in four-page bulletin GED-4305. Construction features are explained, chart lists and diagrams de-

how to build a house in a day...

1 Floor panels are locked to joists laid on permafrost ground.

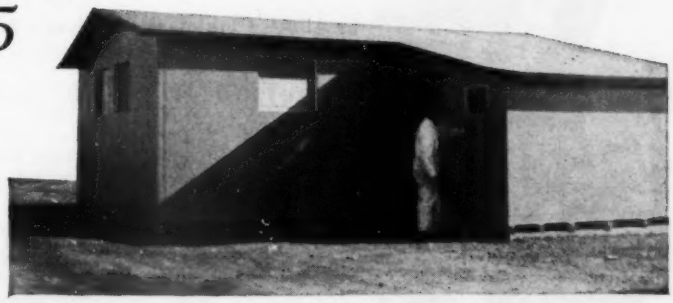
2 Doorway is first wall panel to go up. It locks to floor.

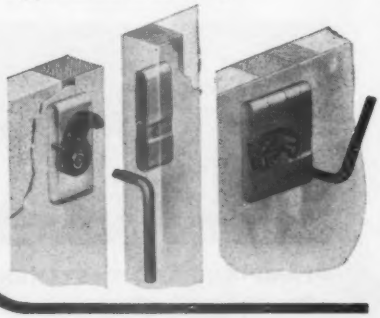
3 Walls and partitions lock to floor and to each other.

4 Roof panels go on last. This takes about three hours.

5 Complete in 7 hours! Floor, walls, roof panels—It's all done with Simmons Dual-Lock fasteners.

Standard Dual-Lock withstands 2500-lb. tension; may be modified for high-load applications to 4500 lbs.





- This house is put up in a day — and can be taken down in half a day!
- Key to quick assembly-disassembly is the Simmons Dual-Lock.

Dual-Lock is a high-load, positive-locking structural fastener perfectly adapted to panel fastening of demountable shelters, shipping containers, covers, cowlings... and to all butt-joint fastening jobs. It can be recess-mounted as in the application pictured, or surface-mounted on sheets or panels. Locks with heavy closing pressure, with very light pressure required on the key.

Arctic Units, Ltd., Toronto, Canada, is putting up 90 "Eskimo Houses" on the DEW Line. Panels, including roof, are plywood-covered styrofoam designed for insulation against Arctic cold.

WRITE FOR CATALOG 760. Complete details of Dual-Lock and other dependable quick-operating Simmons Fasteners with unlimited money-saving applications.

- Samples and engineering service available upon request.

SIMMONS FASTENER CORPORATION

1796 North Broadway, Albany 1, New York

INK-LOCK • HINGE-LOCK • HOOK-LOCK • SPRING-LOCK • CAM-BOLT • DUAL-LOCK • QUICK-LOCK • ROTO-LOCK

Use postpaid card. Circle No. 252

picting available furnace sizes are also included. General Electric Co., Schenectady 5, N.Y.

Use postpaid card. Circle No. 78

C-RING ASSEMBLY PRESS

Two-page information sheet describes automatic C-Ring assembly press for potentiometer component assembly. Altomac Corporation, 863 Washington St., Canton, Mass.

Use postpaid card. Circle No. 79

AUTOMATIC PUNCH RIVETER

Comprehensive summary of three basic models of automatic punch riveters and their uses are presented in 24-page booklet. Specifications for each of the riveters, as well as stretch presses, former-flanger and shrinker-stretcher machines are also given. Special riveting systems and rivets are also described. ACF Industries Inc., Riverdale Plant, Riverdale, Md.

Use postpaid card. Circle No. 80

TRANSFER NAMEPLATES

Explaining the differences between different types of transfer nameplates, "Directory to Quality Transfer Nameplates" is free to individuals and firms. The directory also details nameplates for dry pressure-sensitive applications. Meyercord Company, 5323 W. Lake St., Chicago 44, Ill.

Use postpaid card. Circle No. 81

To Your DESIGN SPECIFICATIONS - From the Hand of the Specialist . . .

ERIE

Bolts • Studs • Cap Screws • Nuts

in Alloys • Stainless • Carbon • Bronze

Experienced hands . . . expert hands . . . hands grown competent by 45 years of the finest precision work. These are the hands of our specialists who meet your design and engineering specifications. Special Erie fasteners to meet the rigors of extreme temperatures, corrosion, tensile stresses are serving widely diverse industries the world over. Send your specifications to us, confident of the finished precision fasteners you expect.

A SUBSIDIARY OF RIC REPUBLIC INDUSTRIAL CORPORATION

ERIE BOLT & NUT CO.

Erie, Pennsylvania

Representatives In Principal Cities

MICROSCOPES FOR ASSEMBLY

Holding critical tolerances and simplifying the handling of parts otherwise too tiny to be comfortably seen, processed and assembled is aided by stereomicroscope described in catalog D-15. Giving optical specifications, complete line of microscopes is described. Bausch & Lomb Inc., 626 Paul St., Rochester 2, N.Y.

Use postpaid card. Circle No. 82

MODULAR ASSEMBLY LINE

Space saving production assembly system using modular construction is described in four-page folder FL-860. Showing how the modular components can be rearranged, removed or added to as changing production requirements demand, photos show actual use of the bench on production line assembly. Flotron Industries, 1608 Centinela Ave., Inglewood 3, Calif.

Use postpaid card. Circle No. 83

SNAP RING CHART

Catalog Supplement 27S, charts exact size silhouettes of 52 snap rings contained in K-D 985SP emergency package. Also included is chart containing catalog number and ring sizes. K-D Tools, 526 N. Plum St., Lancaster, Pa.

Use postpaid card. Circle No. 84

PANEL FASTENERS

Self-aligning, self locking P-Series panel fasteners are described in six-page engineering bulletin. Specifications, engineering drawings, and charts on test data are also included. Hi-Shear Corporation, 2600 West 247th St., Torrance, Calif.

Use postpaid card. Circle No. 85

STAMPINGS AND FASTENERS

File sized catalog illustrates a variety of examples of ribbon form stampings, eyelet stampings, and stamped assemblies. Automatic equipment for volume

Answer to problem on page 44
The price was figured by adding the square of the sum of digits of the previous price TO the previous price.

TORQMATIC

By ARO

Versatile Screwdrivers and Nutsetters with

Single Action Clutch

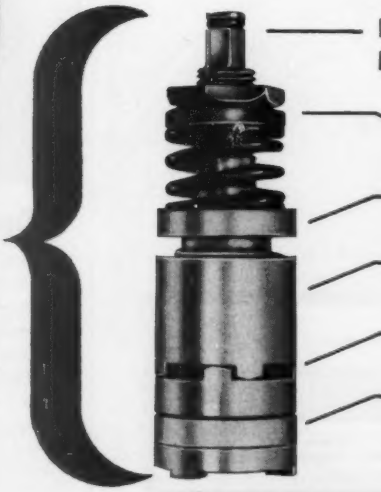
This new Torqmatic is no ordinary clutch. First — it's *fully interchangeable* with the clutch and housing on any Aro "O" Series C-Model tool. No adaptors needed. No special tools. This means you can now get the proper torque control for varying job needs.

What's more, Aro Torqmatic delivers uniform torque action through any number of cycles. Torque is preset and operator cannot overrun the threaded fastener. Action is positive. Clutch disengages instantly when torque limit is reached . . . and remains disengaged until pressure on the work is released. No noisy ratcheting. No impacting action. You can use the Torqmatic on delicate jobs.

The Aro Torqmatic features simple design with a minimum of working parts. You can count on it for highest reliability. Job test it. Ask your Aro Distributor.

Fully Interchangeable With The Clutch In Any ARO "O" Series C-Model Tools . . .

— NO ADAPTORS! —



Easy to Adjust — Maintains Settings Indefinitely

Positive Torque Adjustment

Smooth Ball Bearing Action

Constant Dynamic Balance

Declutches Without Kicking

Front End Support

THE ARO EQUIPMENT CORPORATION
Industrial Division • Bryan, Ohio

Aro of California, 3141 S. Grand Ave., Los Angeles 7
Aro Equipment of Canada Ltd., Rexdale (Toronto), Ont.
Offices in Principal Cities

AIR TOOLS
Air Hoists-Automation Tools
Ultrasonic Controls

ARO

Use postpaid card. Circle No. 258

assembly work is pictured, as well as company's tool and model making facilities. Catalog also includes special fasteners, flanges, nuts and hollow roll studs. Waterbury Pressed Metal Co., 300 Chase Ave., Waterbury 14, Conn.
Use postpaid card. Circle No. 86

THREAD ROLLING METHODS

How operation costs in all types of rolling operations were reduced in 15 cases, is described in a 20 page booklet. Bulletin LHY-10 shows applicable continuous rolling, in-feed, or thrufeed operation, methods and specifications for each case. Landis Machine Co., Waynesboro, Pa.
Use postpaid card. Circle No. 87

TECHNICAL ARTICLES INDEX

The reviewing of over 1800 engineering and technological publications at the time of issue is the basis for compilation of technical article annotation and cataloging. Catalog to articles is furnished free. The Engineering Index, 29 W. 39th St., New York 18, N.Y.
Use postpaid card. Circle No. 88

MANUAL WIRE WRAP TOOLS

Hand operated wire wrap tools are listed and described in four-page catalog filler. Specifications, wire sizes, and tool capacities are included. Gardner-Denver Co., Quincy, Illinois.
Use postpaid card. Circle No. 89

CLAMPING LEVERS

Clamping levers, machine handles, balanced cranks, compound rests and hand wheels are illustrated in four-page information folder. Also included are charts for each type of crank, showing catalog number and dimensions. Balcrank Incorporated, Disney and Brookins Sts., Cincinnati 9, Ohio.
Use postpaid card. Circle No. 90

HOSE CLAMPS

Size and use of Punch-Lok hose clamps are charted in twelve-page information bulletin No. 300. Also included are tooling accessories for installation of hose clamps, and leak-proof hose fittings. Punch-Lok Company, 321 N. Justine St., Chicago 7, Ill.
Use postpaid card. Circle No. 91

ASSEMBLY PRESSES

Bulletin 85 describes a completely new line of 28 single-acting, air presses for assembly operations. Photos and specifications describe the machines, ranging from ½ to 2 capacities at 85 psi in four sizes. Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N.Y.
Use postpaid card. Circle No. 92

PLUG VALVES

Described in four-page bulletin D-1 are two screwed end plug valves, rated at 300 ASA. Each feature of the valve design, handle, bore configuration, straight-through flow passage, Teflon sleeve, tapered plug, Teflon diaphragm and cover is explained in a keyed diagram. Continental Manufacturing Co., 230 Park Ave., New York 17, N.Y.
Use postpaid card. Circle No. 93

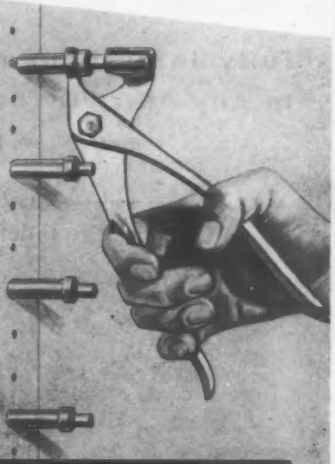
WIRE MARKERS

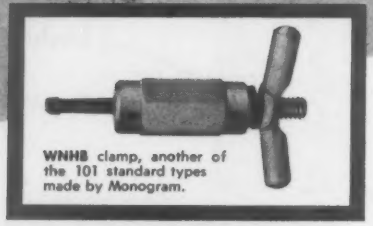
Bulletin contains a list of over 400 different miniature wire markers for temporary or permanent identification of small wires and electronic compo-

HOLD IT!

...better, faster, at lowest cost with Monogram Kleko Clamps

Stop wasting time and money with less efficient temporary fasteners and start solving all your sheet metal holding problems using MONOGRAM Kleko clamps and affixing tools. Write, wire, phone now for information on our 101 precision-engineered standard clamps for practically every temporary holding need during fabrication. *And, if we don't carry the clamp you call for, we can make it faster, better to highest specifications.*





WNHB clamp, another of the 101 standard types made by Monogram.

MONOGRAM Precision Industries, Inc.
8557 Higuera Street, Culver City, Calif., UP 0-6531

Use postpaid card. Circle No. 256

Don't blindfold him!

THE AWESOME-looking instrument in the picture above is an electron microscope. Through it, a cancer researcher can observe the detail of a cancer cell—magnified 100,000 times.

The microscope costs $35,000 and was paid for by American Cancer Society funds—which support 1300 scientists, all working to find the cause of cancer, and its prevention.

Don't blindfold cancer research. Give to it. Send your contribution to CANCER, c/o your local post office.

AMERICAN CANCER SOCIETY

Optimum results aren't necessarily reached the first time a part is redesigned for cold heading. Careful re-examination by Hubbell engineers may suggest a new and more efficient redesign which will make a part even more economical. As in this Hubbell case history, design evolution produced a better end product with substantial savings in assembly costs.

Original threaded stud and separate nut expensive to produce and assemble. RESULT: Wasted time and materials.
Redesigned for cold heading: the stud and the nut section are combined. RESULT: Savings in production, labor and materials.
Redesigned again for cold heading . . . nut section removed and knurl section added. RESULT: Faster, easier assembly; greater product security

Hubbell Cold Heading may provide equally dramatic results for you. Whether it is presently cold headed or not, send blueprint of part or sample for analysis and estimate.

HARVEY
HUBBELL,
INCORPORATED
MACHINE SCREW DEPARTMENT
BRIDGEPORT 2, CONNECTICUT

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nents. Bulletin No. 130-G also contains technical and engineering data for ready reference, and specifications of wire markers. W. H. Brady Co., Dept. 130, 727 W. Glendale Ave., Milwaukee 9, Wisconsin.

Use postpaid card. Circle No. 94

METAL CUTTING LUBRICANT

A bonded lubricant coating for ferrous surfaces is described in data sheet. In addition to giving full specifications for the coating bulletin includes data from actual tests of the material on metal cutting tools. Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Connecticut.

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CAM LOCKS

Universal cam lock line with a series of standardized basic units in a range of sizes and tailored to the needs of the design engineer, are listed in catalog form. Feature of the catalog is the numbering system, which allows the ordering of cam locks with a variety of functions under one catalog number. Independent Lock Co., 1950 Cleghorn St., Fitchburg, Mass.

Use postpaid card. Circle No. 96

CIRCULAR SLIDE RULE

Pocket sized, circular slide rule which accurately multiplies, divides, and finds proportions, is offered free to engineers and executives. Request must be made on business letterhead. General Industrial Co., 1788J Montrose Ave., Chicago 13, Ill.

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OEM BAND CLAMP

Band clamp designed for heavy OEM applications and industrial ducting, such as sleeves, air filters and hose is described in data sheet, OEM 760. Features of the clamp, as well as engineering drawings and size chart are included. Wittek Manufacturing Co., 4305 W. 24th Place, Chicago 23, Ill.

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ASSEMBLY WELDING GUN

Welding gun suitable for assembly line production, features quickly interchangeable nozzles and is described in bulletin M-1. Other features, as well as photographs of gun in use, are also included. No-Arc Equipment Co., 321 Academy St., Newark, N.J.

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PROJECTION WELDING

Twenty-page technical booklet SP-27 gives detailed information on projection welding techniques, projection

COLD HEADING SAVES OVER 300% ON THIS TERMINAL POST

Due to the many technical problems involved, only Hubbell was willing to tackle this job. The result: big savings in production costs, greater uniformity, and faster delivery. This is just one more example of Hubbell's ability to solve tough and unusual cold heading problems.

Original Screw Machined Part	Same Part Re-designed for Hubbell Cold Heading
	HEAD INDENTED to fill out sides, make corners sharp **MINIMUM FILLET** under head to permit close seating **SHANK EXTRUDED** due to equal dia. of shank and thread **CLOSE TOLERANCE MAINTAINED** on length and diameter **CRITICAL FIT . . .** to class #2 specifications

*A closer look at your fastener requirements may reveal some that lend themselves to the economies of Hubbell cold heading. If so, investigate! Send us samples or blueprints of the parts for analysis and estimate. No obligation.

HARVEY
HUBBELL,
INCORPORATED
MACHINE SCREW DEPARTMENT
BRIDGEPORT 2, CONNECTICUT

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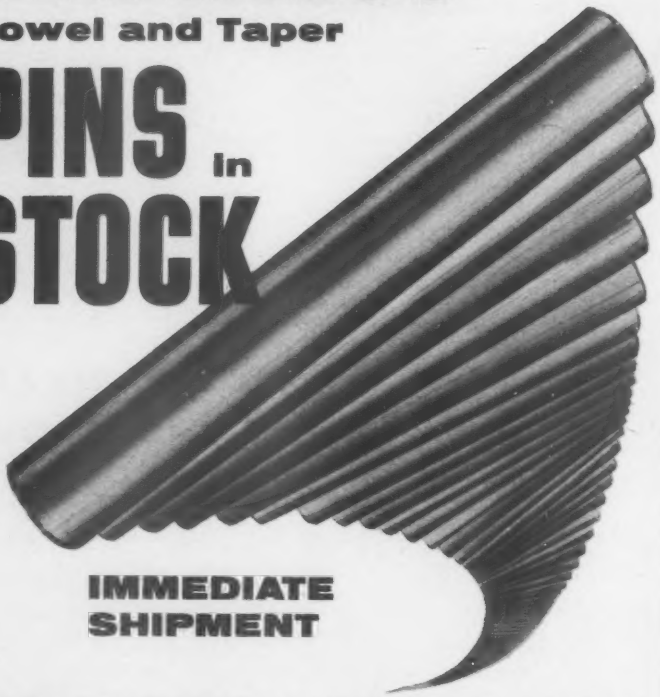
Endless quantities of

STAINLESS

Dowel and Taper

PINS in STOCK

Precision to:
+.0002
−.0000



IMMEDIATE SHIPMENT

DOWEL PINS

Precision Tolerance

- Stainless steel 18-8, type 303
- Diams: .0312 through .500
- Lengths: 3/32" through 2½"
- Chamfered ends

TAPER PINS

Commercial, Precision and AN

- Stainless steel 18-8, type 303 Also many in type 316 (Commercial tolerance)
- Size: 9/0 through 10 in stock
- Lengths: 3/16" through 8" (Not all lengths in all sizes)

- "Specials" manufactured promptly. Large variety of raw material, on hand, for fast service.

PLUS all types and sizes of screws (slotted, Phillips–both magnetic and non-magnetic–hex, socket), bolts, nuts, washers, rivets, nails, keys, etc.

Phone or write for prompt quotation or shipment. Ask for complete catalog.

ALLMETAL®

SCREW PRODUCTS COMPANY, INC.

Manufacturers of stainless steel fasteners since 1929

821 Stewart Ave., Garden City, L.I., N.Y. Phone: Pioneer 1-1200, TWX GCY603

Midwest Division — 6424 West Belmont Avenue, Chicago 34, Illinois
Phone: AVenue 2-3232 — TWX CG 3185

West Coast Division—Warehouse & Office
5822 West Washington Boulevard, Culver City, California
Phone: WEbster 3-9595 — TWX: LA 1472

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forming tools, welding electrodes and joint design. Drawings show design of tools for forming the recommended shapes. Special electrode and tool designs are also described. Taylor Winfield Corp., 1048 Mahoning Ave., Warren, Ohio.

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WELDING APPLICATIONS

Case histories outlining engineering services performed by company in solving specific welding problems, are photographed and discussed in eight page information folder, A-3. Also included are application data for each of the welding electrodes used. The McKay Company, 1005 Liberty Ave., Pittsburgh 22, Pa.

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PUNCHES AND DIES

Die section and engineering drawings of Series A, B, C, and AA, BB, and CC dies are shown in three-page technical information sheet. Also included are prices for each size and series die section manufactured. Richard Brothers Punch Division, Allied Products Corp., 26500 Capital Ave., Detroit 39, Michigan.

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SHEET METALWORKING UNIT

A multi-purpose, single-station sheet metalworking machine with a 30" throat depth is described in eight-page catalog, 30S. Also described are special production-tested accessories. Wales Strippit Inc., 58 Buell St., Akron, N.Y.

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WELD NUT CATALOG

Flanged, pilotless and RN and PN weld nuts, are listed in 44-page catalog. Application and dimensional information, as well as recommended weld set up are included. Ohio Nut & Bolt Co., 33 First Ave., Berea, Ohio.

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NYLON HARNESS CLAMPS

Nylon clamps ideal for use with hydraulic lines or electrical wiring harness, and designed to withstand vibration or pinching of wires, are described in two-page bulletin. Included are engineering specifications and drawings showing complete line of 19 Clamp-Tite sizes. Olympic Plastics Co., 3471 S. LaCienega Blvd., Los Angeles 16, Calif.

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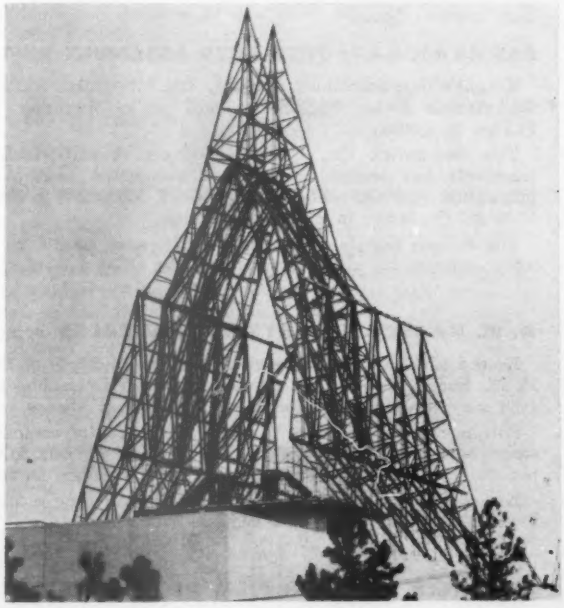
Tetrahedron, fabricated from steel pipe is bolted into place at construction site.



Republic steel pipe was employed as primary structural members for the Air Force Academy chapel.

1960 FASTENER SHIPMENTS 7% BELOW 1959

Shipments of industrial fasteners in 1960 were 94% of the 1956-58 average, 7% below the 1959 figure.

During the first quarter of 1960, shipments were at a high level, replacing production lost during the 1959 steel strike. During the second and third quarter, shipments held around 93%. Fourth quarter shipments fell to an 83% average.

December shipments were 4 points higher than November at 85% of the base average. Compared to December 1959, shipments were off 17 points.

SEE GREATER USE OF ALUMINUM FASTENERS

Greater use of aluminum fasteners is anticipated in 1961, according to Richard Ladner, sales manager of Alcoa's fastener and screw machine product sales.

Largest user of aluminum fasteners again will be the architectural industry, with construction of new entertainment structures contributing to the expanded use.

Sophistication of cold heading techniques is also enhancing the role of the aluminum fasteners in industry. Many pieces formerly made by machining are now turned out on cold-heading machines at a faster, more economical rate.

WELDED PIPE USED IN AIR FORCE CHAPEL

One hundred tetrahedral-shaped supports made of steel pipe have been erected for the many-spired chapel at the United States Air Force Academy, at Colorado Springs.

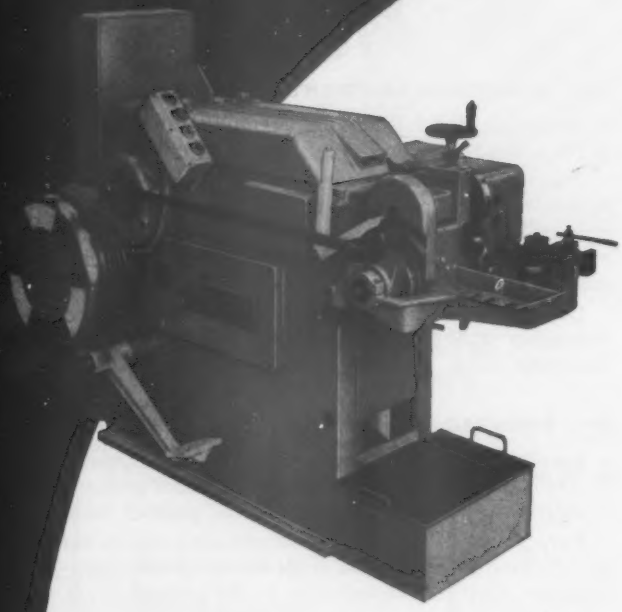
The 75-foot long shapes are fabricated from Republic Steel's four-inch and six-inch diameter steel pipe. The pipe was nominated for the job by architects Skidmore, Owings & Merrill to meet the precision fabrication required to make the unusual shapes and to provide high strength.

The use of steel pipe was a significant consideration. Unlike more conventional structural forms that can be put together from "I"-shaped or "H"-shaped beams, the tetrahedrons call for fabrication of complicated miter joints. The use of the pipe greatly facilitates the handling of the unusual precision joints.

continued

top production economy

ROY SP-1 HIGH SPEED HEADER



If you cold-head screws, bolts, rivets or similar parts you owe it to yourself to see the ROY SP-1 (SDDS) High Speed Header. This value-packed Header is of advanced design cold-heading 275 *precision* pieces per minute on ¼" diam. and smaller blanks — up to 1½" in length. The ROY SP-1 gives top performance because it is made to top quality standards! Send for complete information on this profit-builder today.

Another Famous Member of the ROY "Family" — Model C SCREW SLOTTER

SOLE DISTRIBUTORS

ROY MACHINERY & SALES, INC.

NEW BRITAIN AVE. • FARMINGTON, CONN.

The pipes were cut to proper length and welded into shape with the aid of special welding patterns for the torches and special jigs for holding and turning the pieces during assembly.

To each tetrahedron frame, steel angles will be welded on to hold the chapel's skin in position. The attachments are less complex with the cylindrical surface than would be possible with the ordinary structural forms. According to the contractor, Mississippi Valley Structural Steel Co., the curtain-wall type construction panels are fitted on to the pipe skeletons and hoisted into position.

The completed chapel will resemble a series of spires pointing skyward, each triangular shape standing single file in a row with the other. The points of the sections, in a full view forming the side, look like a ridge of gleaming knife blades.

RESEARCH CHEMIST JOINS ALPHA METALS

Daniel Gray, research chemist credited with changing indium from a laboratory curiosity to a commercial metal, has been appointed special consultant on technical problems by Alpha Metals, Inc.

Before joining Alpha Metals, Gray was a leading research chemist with Oneida, Ltd. for 42 years. He occasionally interrupted this tenure to work on special chemical projects such as the one on indium.

In addition to being responsible for all Oneida packaging materials, he worked on semi-micro and trace analysis development of improved methods of analysis.

Through his research experience, Gray has become a specialist in the problems of tarnish and corrosion. His work involved much study of silver and silver alloys, metallurgy of silver alloys, diffusion of metals and electrodeposition of metals and alloys.

A graduate of Millikin University, he holds some 20 patents in the fields of electrodeposition, alloys, abrasives and packaging materials. His papers on indium plating, trace impurities in silver and electropolishing have been published by The Electrochemical Society and The American Electroplaters Society.

PERMAWICK EXPORTS AUTO ASSEMBLY UNITS

Europe's first automated assembly and lubrication facility for electric motor components will begin operation in France by spring.

The Permawick Co., Detroit, producer of self-wicking lubricants has shipped Permapress automated assembly-lubricating machines and a supply of lubricant to Les Moteurs Fourmies, in Fourmies, France.

The French firm is a Westinghouse licensee, producing a wide range of fhp electric motors for the OEM market.

H. M. HARPER REPORTS RECORD SALES

Record sales in both the metals and bolt divisions of the H. M. Harper Co. for the fiscal year ended December 31, 1960 were the highest in the company's 38-year history.

Earnings per share were $1.49 on the shares of common stock outstanding. Last year, the company earned $1.43 per share, based on the same number of outstanding shares.

Net sales of the company were also at an all-time record. For 1960 they totaled an 11% increase over 1959.

ALUMINUM WELDING FILM RECEIVES AWARD

The Antwerp Film Festival Committee announced the award of its highest motion picture honor, the Diplome De Merite Exceptionnel, to a Louisville company, Vogue Film

Productions, for the industrial motion pictures, "Welding Aluminum—Different, Not Difficult."

A separate award was presented to the film's sponsor, Reynolds Metals Co.

The festival is held each year by the Ministry of Labour, Kingdom of Belgium, to gather, study and compare industrial films. The 1960 competition included 450 films from 30 countries. The top 38 films were awarded the Exceptional Merit rating. Other films in this group from the United States were sponsored by the U. S. Air Force, Monsanto Chemical Co., and the New York Railroad.

TOWNSEND ANNOUNCES SALES DIV. CHANGES

Townsend Co., has announced three sales executive changes in its Engineered Fasteners Division and its Fabricated Products Division.

William R. Wyckoff, has been appointed marketing manager for the Fabricated Products Division. He will direct sales and marketing activities from his headquarters in West Newton, Pa.

Wyckoff, who is chairman of the Permanent Mechanical Fasteners and Building Committee of the national Building Research Institute, has been associated with Townsend for 12 years.

P. F. Barry, will assume Wyckoff's duties as assistant sales manager of the Engineered Fasteners Division in Ellwood City, Pa.

R. M. Thompson replaces Barry as eastern district sales manager in Philadelphia. With Townsend 14 years, Thompson also has served as assistant mid-western sales manager.

MILFORD RIVET ELECTS GORDON EXEC. V-P.

Robert M. Gordon has been elected executive vice-president of the Milford Rivet & Machine Company.

In 1942 Gordon joined the Penn Rivet & Machine Co. of Philadelphia, where he worked in manufacturing and engineering capacities, and, after Penn Rivet was acquired by Milford Rivet in 1945, was transferred to Milford's New England Division as machine sales manager. He then was successively appointed sales manager of the New England Division and assistant general sales manager, before leaving the company to join The Torrington Manufacturing Co., as sales manager of the Air Impeller Division. He returned to Milford Rivet 2½ years later as general sales manager and in 1957 was elected vice-president of sales.

THOR POWER TOOL EXPANDS STOCK LISTING

Thor Power Tool Co., producer of air and electric tools is now listed on the New York Stock Exchange.

The company's symbol on the Exchange Trading floor and listings will be TPT. Thor Power Tool stock has been listed on the Midwest Stock Exchange since 1923 and will continue to be listed on that board.

WELDING LAB AT INCO'S HUNTINGTON PLANT

A new welding laboratory has been placed in operation at International Nickel Co.'s Huntington Alloy Products Division. Construction of the 4000-square foot facility was completed in December, and specialized equipment is now being installed.

A major part of the research to be conducted at the new laboratory will be in the nuclear power field for both industry and national defense.

The $200,000 laboratory reflects an expanded welding research and development program that has three major objectives: research leading to the development of new

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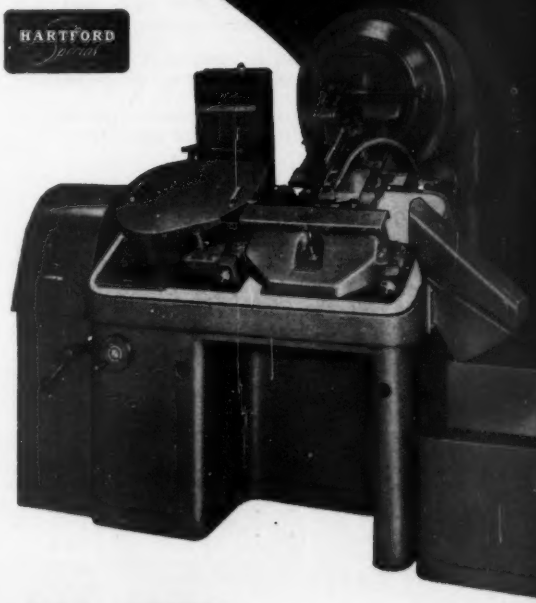
faster, lower-cost production

HARTFORD 400
AUTOMATIC
THREAD ROLLER



ALL NEW

Here's a *major* advance in automatic thread rolling — the new Model 400 by Hartford Special with *capacity up to 400 pieces per minute.*

PLUS simplified design for ease of set-up and maintenance. And many new features such as vinyl-lined hopper, separate coolant systems, etc.

THREAD LENGTHS from ⅛" thru 1½"; up to 3" with special dies.

SCREW CAPACITY from #2 thru #10 on Automatic Model; #0 thru #10 on Manual Model.

USES economical standard flat dies.

Write for complete facts today!

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ROY MACHINERY & SALES, INC.

NEW BRITAIN AVE • FARMINGTON, CONN.

welding products to meet the stringent requirements of the nuclear age; mill production control to improve weldability of alloys; and laboratory aid to help solve customer problems.

ACCURATE BUSHING ANNOUNCES NEW LINE

Accurate Bushing Co., has expanded its product line with the introduction of a complete jig and fixture component line.

These products include all popular types and sizes of clamp assemblies, handles, knobs, wheels, spring plungers, and torque screws. Over 1000 items will be available from factory stock. Plans include handling through local stocking distributors.

METRIC THREAD FASTENER SERVICE

A world wide service is provided by the Steel Company of Canada, Ltd., for high tensile steel bolts and nuts produced to the international metric system standards.

European orders for industrial equipment assembled in North America has increased the demand for these fasteners.

The bolts are produced by the cold heading process and heat treated to meet a tensile strength of eighty five kilogrammes per sq mm.

GM SELLS STOCK TO EMPLOYEES

Distribution of more than 11 million dollars in General Motors common stock, government bonds and cash to 54,000 General Motors salaried employees in the United States who participated in the first class of the savings fund plan under the company's savings-stock purchase program, was announced by General Motors.

The distribution was made January 31. It resulted from savings of $6,626,000 by employees and contributions of $3,313,000 by the corporation during the period of October 1 to December 31, 1955, plus interest and the dividends earned on investment of these funds from October 1, 1955, to December 31, 1960, when the class matured. The plan first became effective October 1, 1955.

The distribution will include 151,554 shares of General Motors common stock, 69,691 Series E bonds of varying denominations with a current value of $3,156,000, and approximately $1,700,000 in cash.

As a result of this initial distribution, approximately 35,000 General Motors employees become new shareholders in the company. This brings the total number of GM shareholders to an all-time high of nearly 866,000.

HASSALL ANNOUNCES NEW REPRESENTATIVES

John Hassall, Inc., Westbury, N.Y., announced the appointment of Les Sachs Associates, Los Angeles, as sales representatives for California, Arizona and Nevada. Blake Smith, former Hassall representative, has joined Lester Sachs and William Corbett in this firm.

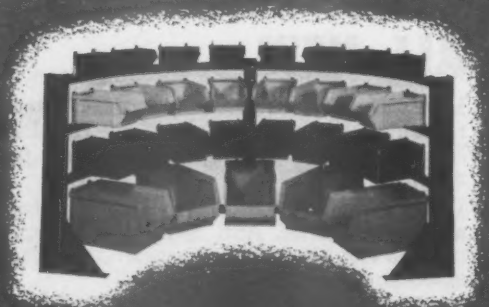
Western Empire, Inc., Englewood, Colorado is now the sales representative for Colorado, New Mexico, Utah and Wyoming.

A. J. Hanson & Company, Seattle, continues as Hassall sales representative for the states of Washington and Oregon.

CHAMPION APPOINTED V. P. OF RIVET FIRM

David J. Champion has been appointed vice president of the Champion Rivet Co. He was formerly sales manager of the Cleveland firm.

Lewis | PLASTIBOX ASSEMBLY CONTAINER ACCESSORIES



SEMI-CIRCULAR BENCH STAND

This bench stand provides ultimate accessibility of pan contents to a single worker. The stands are available to mount all three size Plastiboxes, as shown, or can be furnished for one size, or in other combinations of sizes to suit your assembly work. Boxes can be quickly removed for refilling.

DOUBLE and SINGLE FLOOR STANDS

These new storage racks are available as either free-standing double or single wall-supported units, as shown. Either unit will hold up to 224 Plastiboxes and either will mount all one size or various combinations of Plastibox sizes. Boxes can be quickly removed for refilling.

PLASTIBOX—PATENT APPLIED FOR

G.B. Lewis COMPANY
283 Montgomery Street • Watertown, Wisconsin

Complete details, brochure, prices and information on other accessories are available by writing . . . DO IT TODAY!

Use postpaid card. Circle No. 262

Champion spent two years in Mexico City as general manager of Champion de Mexico, a subsidiary company.

AMERICAN SCREW NAMES OFFICERS

KEULEMANS

COY

Gus Keulemans has been elected executive vice president of the American Screw Co., Division of Noma Lites, Inc.

Keulemans has spent his entire career in the metal fabricating industry, having been associated with Bell Telephone Manufacturing Co., in their largest European fabricating division and a domestic non-ferrous building products manufacturer where he served in many capacities.

John J. Coy has been elected vice-president-sales. Joining the company in 1938, he was appointed assistant sales manager in 1950 and general sales manager in 1953.

PARKER SEAL CO. GRANTS FRANCHISE

All of the 105 distributors of the Parker Seal Company's O-Rings are now franchised for the firm's Stat-O-Seal line.

Stat-O-Seal is a metal retained seal for bolts, studs, and other fasteners and fittings.

Most of the distributors will carry stocks of all popular sizes of the new line and will be able to make immediate delivery.

PENDLETON TOOL PROMOTES OETJEN

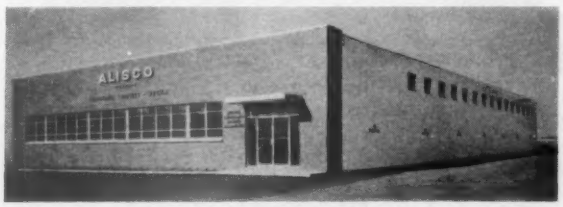
H. W. Oetjen has been promoted to the position of vice-president for sales, automotive and industrial markets.

Oetjen has been with the company, since 1951 when he assumed the position of director of research and development.

In 1953, he became national sales manager, Proto Tool Company, and was appointed sales manager, Western Region, Pendleton Tool Industries, Inc., in 1955.

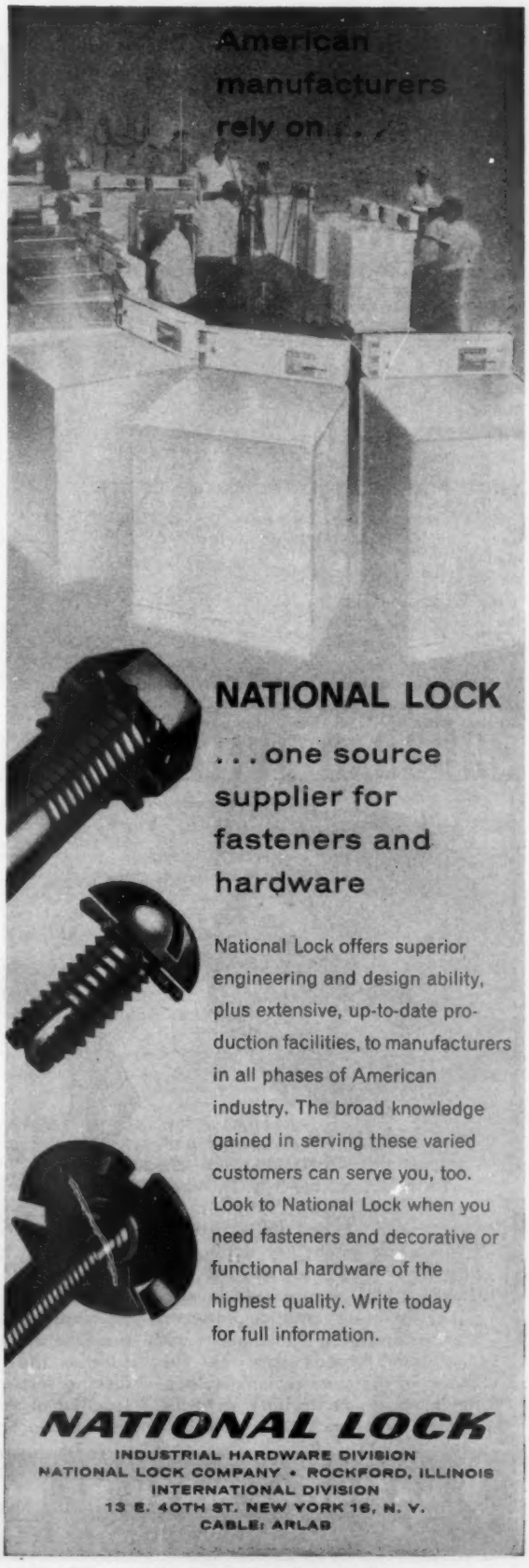
He is a member of The Society of Automotive Engineers.

ALISCO EXHIBITS AT NEW SERVICE CENTER



The Alisco Co., wholly owned subsidiary of Allmetal Screw Products Co., Inc., is sponsoring an exhibit of specialty products to the industry in New York. The exhibit will be held in the company's new distribution center at 809 Stewart Ave., Garden City, and will include specialty products supplied by them to the aviation, electronic communications and industrial fields.

During the exhibit, scheduled for the first week in March, product manufacturers will have representatives present to offer technical information regarding their products.


American manufacturers rely on . . .
NATIONAL LOCK
. . . one source supplier for fasteners and hardware
National Lock offers superior engineering and design ability, plus extensive, up-to-date production facilities, to manufacturers in all phases of American industry. The broad knowledge gained in serving these varied customers can serve you, too. Look to National Lock when you need fasteners and decorative or functional hardware of the highest quality. Write today for full information.
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INDUSTRIAL HARDWARE DIVISION
NATIONAL LOCK COMPANY • ROCKFORD, ILLINOIS
INTERNATIONAL DIVISION
13 E. 40TH ST. NEW YORK 16, N. Y.
CABLE: ARLAB

AEROPROJECTS RECEIVES BRITISH PATENT

Aeroprojects Incorporated, has been granted a British patent on ultrasonic welding equipment and methods and a British and a Canadian patent on a support mount for such vibratory devices.

Recently an agreement was reached between Aeroprojects and the Aluminum Company of America which gave Alcoa the foreign rights to sell and to license the manufacture of Sonobond ultrasonic metal-joining equipment throughout the world except in the United States and Canada.

BRYSON APPOINTED V. P. AT SOLAR AIRCRAFT

W. D. Bryson has been elected a vice president of Solar Aircraft Company, a subsidiary of International Harvester Co.

He will have responsibility for coordination of Solar's engineering and production activities. Bryson has been manager of manufacturing research at Harvester since April, 1955.

THOR POWER TOOL PROMOTES THREE

B. J. Herron, district sales manager at Thor's San Francisco branch the past four years, has been appointed sales manager of the Co.'s Seattle branch with J. R. Householder succeeeding him at San Francisco.

Herron has been with Thor 41 years, having started with the portable air and electric power tool firm in 1919 as an industrial service engineer in the Pittsburgh territory.

Householder has been an industrial service engineer in Thor's Chicago branch since 1954. Prior to that, he had 16 years' experience as a machinist, including three years' service with the U. S. Navy during World War II.

Robert P. Budler, former city editor of the Aurora (Ill.) Beacon-News, has been appointed public relations director.

He served as editor of the Thor Scoreboard, company newspaper, from 1948 to 1954, as a member of the sales promotion department.

SYNFLEX NAMES DISTRIBUTORS

The Synflex Products Division of Samuel Moore & Co., has appointed as authorized master distributors to stock its complete line of Synflex nylon industrial hoses: Midwestern Rubber Co., Cleveland; Shields Rubber Corp., Pittsburgh, and Buffalo Rubber and Supply, Inc., Buffalo.

RAMSEY CORP. NAMES DIV. MANAGER

Richard Marshall has been appointed manager of the Retaining Ring Division of the Ramsey Corp.

He succeeds Ken Walden who represents Ramsey as a manufacturers' agent in the New England states.

Marshall had been doing customer relations and sales work in the Retaining Ring Division since joining Ramsey four years ago. Prior to that he was vendor sales manager for a popular brand of soft drink.

CURTISS-WRIGHT SIGNS TRADE AGREEMENT

Curtiss-Wright Corporation has announced the signing of an agreement with Grasso's Koninklijke Machinefabrieken, N. V., of 's-Hertogenbosch, Holland, which adds the complete line of Grasso pneumatic hand tools to the Swench

New One-Piece
"Conelok"
with prevailing torque
Fig. 1
Fig. 2
Three sectors of the tapered portion of the CONELOK nut are preformed inwardly (Fig. 1). When the Nut is applied to a bolt, these conforming sectors are elastically returned to a circular configuration and create an inward and downward pressure which produces intimate contact between the load carrying flanks of the nut and bolt threads (Fig. 2). The shape of the cone sector displacement insures conformity with the mating bolt and maximum friction contact area. . . . The closed stress path in the locking portion of the nut and the advantageous distribution of locking pressure, produce a locking device of high fatigue life . . . and equivalent locking force is exerted at only a fraction of the stress of any slotted type locknut. CONELOK maintains its locking action through many re-applications. . . . It is adaptable to high, and low torque assemblies . . . to high torque stop-nut applications . . . and may be obtained in sizes from No. 10 through 1½", Full and Thick dimensions are "Standard". . .
Send for brochure which includes complete engineering specifications.
NMP
NATIONAL MACHINE PRODUCTS COMPANY
an SPS company 44250 UTICA ROAD UTICA, MICHIGAN
Use postpaid card. Circle No. 264

manual impact wrench line now being marketed by the Marquette Division of Curtiss-Wright.

The division will begin immediately to establish distribution through the United States for the pneumatic tools including riveters, drills, hammers, bench vises and accessories, such as air filters and quick connection couplings.

It will also market a six-in-one pneumatic tool unit for drilling, cutting, sanding and buffing.

FLICKINGER HEADS CHICAGO BOLT ASSN.

Edward J. Flickinger, assistant to the president of the Indiana Cap and Set Screw Co., has been elected to the vice presidency of the Chicago Bolt, Nut and Screw Association.

Flickinger is a specialist in marketing and general administration.

The association is composed of principal officers and senior executives of manufacturers and distributors of industrial fasteners in and around Chicago.

A-C BOSTON WORKS PROMOTES TWO

Allis Chalmers Boston works has filled two positions by naming Joseph L. Desmond as works manager and Warren A. Kulberg as manager of industrial and community relations.

Desmond joined the Boston works in 1942. In 1957 he became manager of industrial and community relations.

Kulberg has been with the company since 1936. In 1957 he was made assistant superintendent of production and in 1958, superintendent of production, the position held until his latest appointment.

AEROSPACE FORMED AS PART OF NYLOK

The first affiliated company under a new corporate expansion plan is now operating in Hawthorne, N.J., as the Aerospace Nylok Corp. The new firm has taken out the standard licensing agreement with The Nylok Corporation.

Aeropsace Nylok will specialize in self-locking threaded fasteners for the aircraft, missile and electronic field, but will handle a full line of commercial Nylok fasteners as well.

J. E. Johnson, president of the new firm, was associated with the Nylok Corporation for 15 years, serving both as vice president of manufacturing and vice president of engineering.

GIBSON ELECTRIC FORMS SALES CO.

Gibson Electric Co. has formed the Gibson Electric Sales Corp. as a wholly owned subsidiary to handle sales and marketing of its electrical contacts, contact assemblies and powdered metallurgical items. The new firm is located at the parent company's plant at Delmont, Pa.

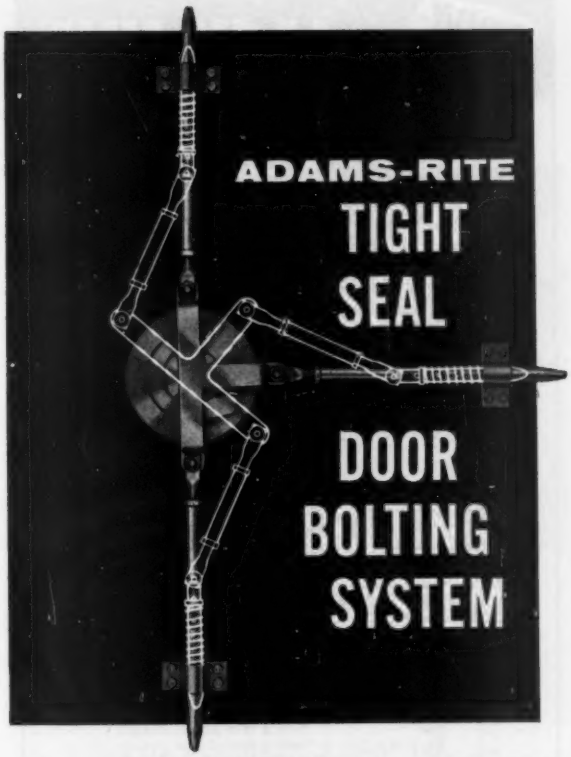
Robert R. Stone, formerly the Gibson Electric Company's sales representative in Ohio and Western Pennsylvania, has been appointed executive vice president of the company and Malcolm Anderson marketing manager.

ROCHESTER SALES REPS FOR DENISON

A sales office has been established in Rochester, New York, by the Denison Engineering Division, American Brake Shoe Co., Columbus, Ohio.

Sales of hydraulic multipresses and pumps and controls will be handled from the same office, Thomas Tauer directs sales of Multipresses, while Phillip Shrider is in charge of pump and controls sales in the area.

The office was established to provide better service to



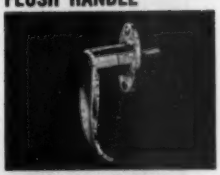
FOR POSITIVE CLOSURE

ADAMS RITE multiple-bolt systems are designed for use on doors and panels which must be secured at more than one point. They are of particular value on doors or hatches which must be closed with a POSITIVE seal to prevent the entrance or escape of moisture, air or gas. Environmental chambers, electronic equipment, pressurized testing units, and paint spray booths are a few of the applications where these A-R systems have proven themselves.

ADAMS RITE has been manufacturing precision mechanical products for over 50 years and is the major supplier of door hardware for the aircraft industry. A-R products are Designed for a Purpose and include locks, latches, handles, door bolting systems, tie-down fittings, and mechanical controls. Products for specialized applications are designed and manufactured to customer specifications.

AVAILABLE WITH:

FLUSH HANDLE



LOCKING HANDLE

NON-LOCKING HANDLE

Write for complete information or latest file catalog of descriptive literature. Dept. B-2

"Over half a century"

ADAMS RITE
MANUFACTURING COMPANY
540 West Chevy Chase Drive
Glendale 4, California

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MOLLY®

JACK NUT

The Only Blind Fastener Which Grips Any Material From 0" To 3/8" Thick

The Jack Nut cuts cost, speeds assembly, solves hitherto impossible fastening problems. Can be used as a rivet and/or blind fastener. It's versatile, easy to use and no special tools are needed.

The only blind fastener with threads which grips any material from 0" to 1/2" thick. Needs only 1/8" expansion space. Allows holes to be fashioned before, during or after fabrication. Hole size is not critical and special type of hole is not necessary.

Made of quality steel, cadmium-plated. Grips evenly on rough as well as smooth surfaces. Provides vibration-proof assembly. Weight-carrying capacity is limited in most cases only by strength of the material in which used.

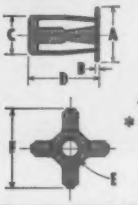
EASY TO INSTALL

1. Insert Jack Nut into hole. Needs only 1/8" expansion space.
2. Run in screw to collapse spider anchor backing by exerting pull on thread.
3. Jack Nut now is installed and ready to receive attachment screw.

Sold By Wholesale Hardware, Electrical Wholesale & Industrial Supply Distributors

MOLLY® CORP.
2306 N. 8th St., Reading, Pa.

SPECIFICATIONS



CAT. NO.	A CAP DIA.	B CAP THICK.	C BODY DIA.	D O'ALL L'GTH.	E THREAD	F MAX. SPREAD
4-S, JN	15/32	3/64	9/32	9/16	6-32	43/64
4-L, JN	15/32	3/64	9/32	3/4	6-32	43/64
* 6-S, JN	17/32	1/16	3/8	11/16	10-24	25/32
** 8-S, JN	3/8	1/16	27/64	3/4	1/4"-20	13/16

S for 0" to 3/16"; L for 3/16" to 3/8"
*8-32 & 10-32 threads available
**10-24 & 12-24 threads available
NOTE: 4-S, JN & 6-S, JN also available in brass

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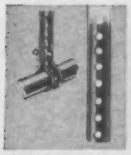
Weckesser Plastic Products

BLACK NYLON CABLE CLAMPS

BLACK NYLON SNAP CLIPS

BLACK NYLON HALF CLIPS

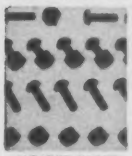
WEDGE LOCK BAND CLAMPS

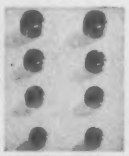

PERFORATED BLACK NYLON STRAPPING

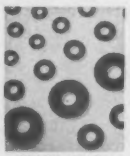
TEFLON CABLE CLAMPS

ETHYL CELLULOSE CABLE CLAMPS

THREADED NYLON ROD


MOLDED BLACK NYLON SCREWS


BLACK NYLON CAP NUTS


BLACK NYLON WASHERS

"D" WASHERS

WRITE FOR FURTHER DETAILS, SPECIFICATIONS AND PRICES

Weckesser COMPANY
5701-A Northwest Highway • Chicago 46, Ill.

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the expanding hydraulics market in central and upper New York State.

ALLEN MFG APPOINTS TWO

WEST

KELLSTRAND

Edmund West has been appointed works manager of the Allen Manufacturing Co. He will be in charge of all phases of production control, and manufacturing and industrial engineering. Prior to joining the company, he was associated with Allied Products Corp., and Pressed Metals of America, Inc.

Bengt E. Kellstrand has been appointed field sales representative for the company's upper New York State area. He was formerly associated with Ramsdell Industrial Supply and the U.S. Envelope Co.

HOME BUILT WITH ALUMINUM STRUCTURE

A home being built near Detroit uses an all aluminum structural frame. It can be put together with a hand wrench, screw driver, bolts and screws.

Reynolds Metals Co., said that for the first time in residential construction, aluminum structural members form the entire support system.

The home uses a system of pre-cut modular aluminum structurals which can be quickly fabricated into any suitable concept by an inexpensive system of assembly under guidance of an architect.

FIELD REPS FOR PARKER-KALON

DELGOFFE

DWIGGINS

Parker-Kalon division of General American Transportation Corp., Clifton, N. J. has named Robert DelGoffe and Dan Dwiggins as field engineers and fastener consultants.

DelGoffe will service distributors and manufacturers in Wisconsin, North Dakota, eastern South Dakota, Minnesota and the upper peninsula of Michigan.

Dwiggins will service distributors and manufacturers in central Tennessee, Georgia, Alabama, and western Florida.

NEW PRODUCTS MGR FOR CARR FASTENER

Thomas Newbold has been appointed new products manager of the Carr Fastener Co., Division of United-Carr Fastener Corp.

NEW PLANT FACILITIES of the L. C. Miller Co., Monterey Park, Calif., will triple the company's metalworking facilities, such as ultrasonic and electric disintegration machining of space age materials, and metal joining and fabrication by high frequency induction heating.

A graduate of Harvard College and of the Harvard Business School, Newbold has previously served as divisional sales manager and has been with the company since 1940 except for four years as a naval officer during World War II.

As new products manager, he will be responsible for development of new product ideas which can be adapted to specific assembly and fastening applications in the automotive, appliance, furniture, clothing and leather goods industries.

PROMOTIONS AT STANDARD SCREW

GRAHAM

TORRISON

ELLISON

Bernard A. Graham was elected to the board of directors and Hartley Q. Torrison was elected vice-president and controller of the Standard Screw Co., Bellwood, Ill.

Graham joined the company in 1959 on a consulting basis after his long tenure with the Sunbeam Corp. Earlier this year, he was elected vice president in charge of Standard Screw sales.

Torrison who has served as controller since 1955, has been responsible for all cost and budget operations of the company's three divisions since 1946. He joined the company in 1936.

Joseph E. Ellison has been appointed factory manager of

ATTACH

"PAL-NUTS" • "SPEED-NUTS"

in 1/3 the Time

UNIFORMLY !

with Bantam Bully Air Hammers

Model SP-900B attaching Pal-Nuts on speaker assemblies, Trylon Radio Industries.

Bantam Bully Air Hammer weighs only 20 oz., uses 6.5 c.f.m. at 90 P.S.I. Pistol grip or straight handle. For details on improving your fastening operation, write Dept. AF-3.

SUPERIOR PNEUMATIC & MFG., INC.
13500 ENTERPRISE AVE. CLEVELAND 35, O.

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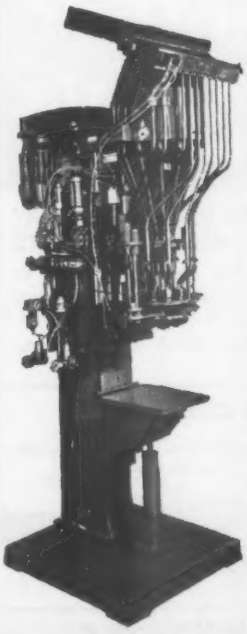
this machine will drive up to 10 screws at one time . . .



. . . reducing assembly costs and improving quality. Built for high production jobs where a fixed set up is practical, this multiple spindle screw driving machine automatically feeds screws from a hopper and drives them to a predetermined torque. Evenly distributed pressure eliminates stresses caused by driving home one screw at a time. A simple sliding fixture positions work pieces accurately.

Machine illustrated shows application of multiple spindle screwdriving to assembly of electric power drills.

Send a sample of your assembly and a list of your requirements. We will be happy to show you how multiple spindle screw driving can be applied to your job.

COOK & CHICK COMPANY
2415 West 24th Street Chicago 8, Illinois

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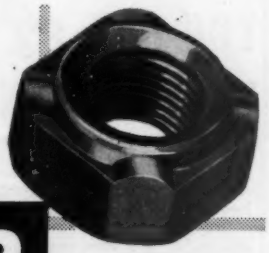
fast...
positive...
economical



DECKER

WELD NUTS

COLD HEAD PROCESS

Decker Weld-Nuts are manufactured to meet your demands for a better, faster, more positive method of parts assembly. Like all Decker Industrial Fasteners, Weld-Nuts are produced via the *cold-head* process to assure a uniform quality and exceptional economy. Decker Weld-Nuts are available in three basic types and a broad range of sizes to meet every conceivable need.

Study your production applications now and see for yourself the many operations where Weld-Nuts could save your production time and dollars.

Then...write for sample fasteners, as well as your copy of Decker's new illustrated Industrial Fastener catalog!

OTHER DECKER INDUSTRIAL FASTENERS

Pipe Plugs

Clinch Nuts

Hex Nuts

DECKER NUT MANUFACTURING CORPORATION
1900 N. CLARK ROAD • ALBION, MICHIGAN

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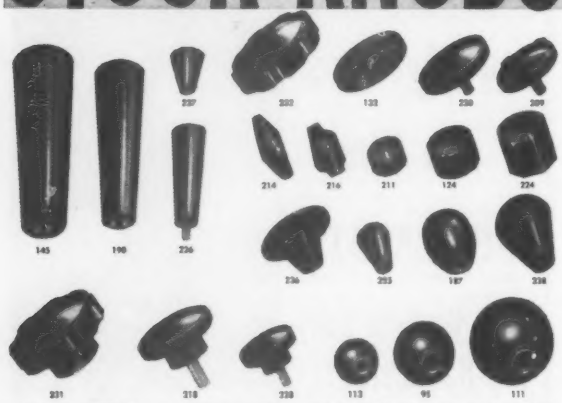
STOCK KNOBS

...NO TOOLING CHARGE!



Wide selection molded plastic knobs, handles, hand-wheels at no tooling charge! Minor changes (inserts, threads, color, etc.) to suit requirements. Other modifications give your part a look of exclusive design at fraction of new mold cost! Write for complete illustrated catalog, or see Sweet's Product Design Catalog File.

DIMCO-GRAY COMPANY

210 EAST SIXTH STREET — DAYTON 2, OHIO

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YOU CAN *Automate* WITH NATIONAL RIVETERS

Automated fastening does not mean thousands of dollars of expense for multi-headed riveting equipment.

Over 90% of the riveting machines in use today are low cost, single riveters, easily converted to new products and new jobs. National has a complete line —including multi-headed units where the job warrants.

National semi-tubular and tubular rivets and riveting equipment is flexible, rugged, low cost. Its use speeds production, often improves quality of the finished product and slashes labor costs.

Find out today. There is no obligation for National's prompt answers to your fastening problems. Send a blue print or a sample of your fastening job.

NATIONAL RIVET & MFG. CO.
211 Main St.
Waupun, Wis.

NATIONAL RIVETS
TUBULAR, SPLIT, SOLID ALL METALS

Use postpaid card. Circle No. 272

the Western Automatic Machine Screw Co. producers of the Stanscrew fasteners. Before his promotion, he was manager of the Moen Faucet and Electric Foundry divisions.

RILEY SUCCEEDS PENMAN AT BETHLEHEM

RILEY

PENMAN

Robert L. Riley, assistant general manager of Bethlehem Steel Company's Lebanon, Pa., industrial fasteners plant has been advanced to the post of general manager, succeeding Walter R. Penman.

Riley has been a member of the Technical Committee of the Industrial Fasteners Institute since 1945; chairman of the Institute's Standard Practices and Technical Committee since 1958, and chairman of sub-committee 1 of the American Standards Association Committee B18.4 on large and small rivets since 1958.

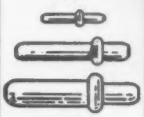
Penman's retirement brings to an end 42 years of association with Bethlehem. Well-known throughout the industrial fastener industry, Penman is a member of the American Iron and Steel Institute, the American Standards Association Committee B1, Standardization and Unification of Screw Threads, A. S. A. Committee B18, Dimensional Standards of Bolts, Nuts, Rivets, Screws and Similar Fasteners.

HUCK NAMES 5 REPS FOR SPECIAL DIV.

Appointment of five manufacturer's representatives for the Special Products Division has been announced by Huck Manufacturing Co.

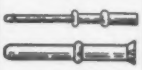
50% SAVINGS with BEAD CHAIN Multi-Swage Parts

CONTACT PINS



TERMINALS

JACKS



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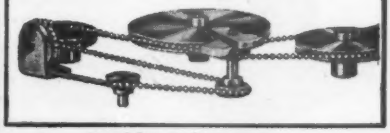

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Edwin A. Schulz Co., Indianapolis will represent the division in the states of Indiana and Kentucky.

Custom Industrials Company, Clayton, Missouri, will represent the division in eastern Missouri and southern Illinois.

Aircraft Components and Engineering Co., Inc., Fort Worth, Texas, will represent the division in Texas, Alabama and Florida.

E. J. Foley and Associates, Scottsdale, Ariz., will represent the division in the states of Arizona and New Mexico.

Aero Motive Special Sales Corp., Detroit, will represent the division in Michigan.

ILLINOIS TOOL PROMOTES SMITH

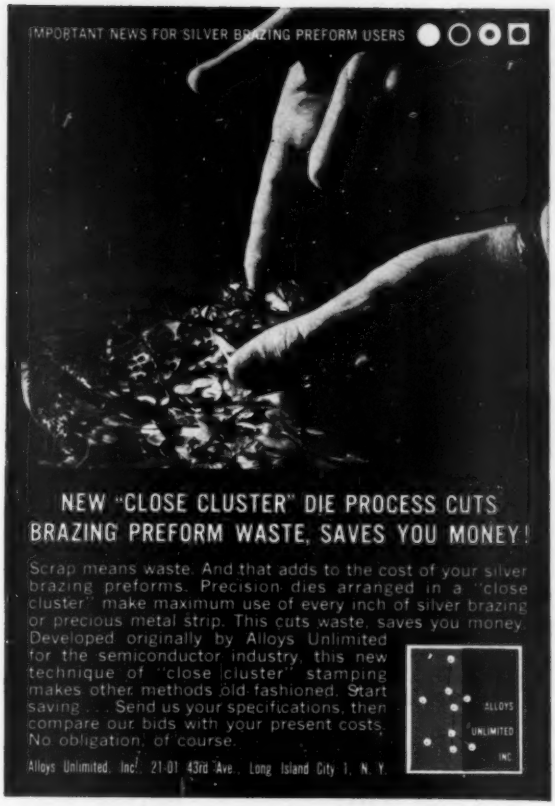
Harold Byron Smith, Jr. has been named manager of New Product Divisions by Illinois Tool Works. He was also appointed to membership on the company's management committee. Smith was formerly general sales manager of ITW's Fastex Division.

In this new capacity he will be fully responsible for the operation of the Paktron Division, Alexandria, Virginia, and the Conex and the Fastex Divisions, Des Plaines, Illinois.

Smith graduated from Princeton University in 1955 and from Northwestern University's Graduate School of Business in 1957. He was appointed chief engineer of Fastex in 1959 and division sales manager in 1960.

OHIO NUT & BOLT SETS UP REGION SALES

In an effort to improve and increase the services and technical assistance it offers its customers, The Ohio Nut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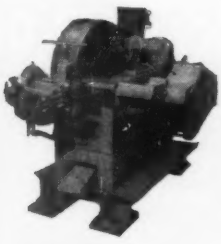

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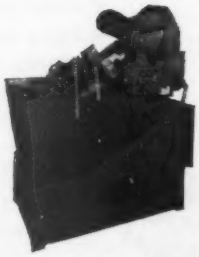

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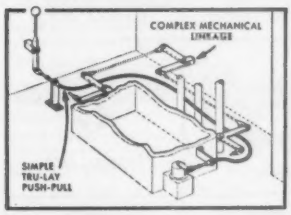

Push-Pull remote controls, shown here, are flexible, have but one moving part, and give a lifetime of accuracy. Mechanical linkages are complex, are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.

This Push-Pull Data File—containing 7 engineering bulletins—will show you how these flexible controls have eliminated mechanical linkages on hundreds of products. You can make *your* products more useful, easier to sell, with Push-Pull controls. Write for your Data File today.

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& Bolt Company has reorganized its sales department on a regional basis.

The new organizational plan divides the nation into three sales regions. Currently with the announcement of the reorganization, appointment of the three new regional sales managers were announced. Those promoted were C. R. Green, Region 1; G. F. Nolan, Region 2; and F. H. Lowry, Region 3.

COFFMAN PROMOTED AT ACME STEEL

Paul W. Coffman has been appointed as general superintendent of Acme Steel's Riverdale plant.

Coffman joined the company in 1950 as assistant superintendent of the Cold Mill Division, and in 1958 was named assistant general superintendent of Acme Steel's Riverdale plant.

Prior to joining Acme, he held responsible positions in the steel industry in Pennsylvania, England and Brazil.

BERKMAN HEADS SCREW & BOLT CORP.

Louis Berkman has been elected board chairman of the Screw and Bolt Corp. of America. He was also elected to the chairmanship of the executive committee.

Berkman, is president of Follansbee Steel Corporation, largest stockholder of Screw and Bolt Corp.; president of the Louis Berkman Co.; board chairman of United Printers and Publishers, Inc.; and an officer and director of The Friendly Group, a chain of radio and television stations.

Also elected to the executive committee, was David Glick, a member of the Pittsburgh law firm of Glick, Berkman and Engel.

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SLOSSER

JONES

Because of the recent development of several new adhesives for the railroad industry and development work currently underway, the Armstrong Cork Co. has created a new department called Railroad Adhesive Sales.

A. J. Slosser has been named manager of the new department. He will work with railroads and manufacturers of railroad supplies in promoting the sale of adhesives for cementing railroad rails and for bonding tie plates to wood ties and in the development of a line of adhesives and protective coatings for maintenance purposes.

E. W. Jones has been appointed manager of industrial adhesives sales (exclusive of railroad adhesives sales). Jones joined the company in 1945 following graduation from the University of Wisconsin.

ACCURATE SPECIALTIES OPENS PLANT

Accurate Specialties Co., Inc. has opened a 15,000 square foot plant in Hackensack, New Jersey, in a move to further meet the growing demands for their semiconductor materials.

The facility is a one-floor plant, specially designed for the production of semiconductor materials. The plant is air conditioned to maintain the high standards of purity essential to the manufacture of semiconductor components. It includes production lines for manufacture of semiconductor preform discs and washers, clad metal base tab stampings, and spheres.

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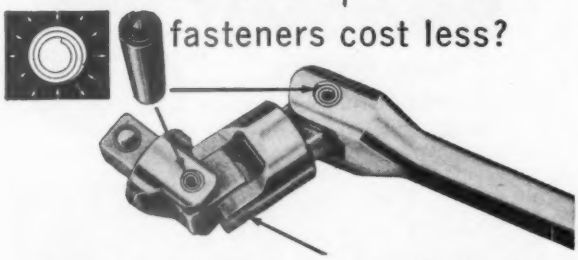

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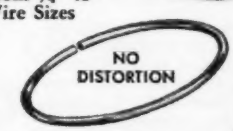

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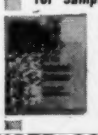

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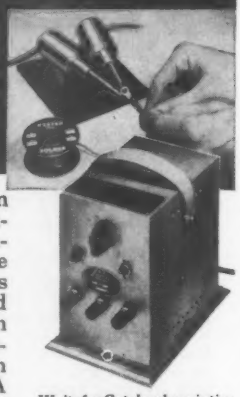

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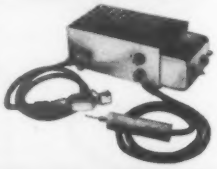

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PARKER-KALON APPOINTS MANAGER

Arnold Rofheart has been appointed advertising manager in charge of advertising and sales promotion of Parker-Kalon, a division of General American Transportation Corp.

Formerly sales promotion manager, Rofheart has been associated with the New Jersey fastener manufacturer since 1949.

IBM EMPLOYEES RECEIVE AWARDS

International Business Machines Corp. announced that it will present $275,000 in awards to 250 employees throughout the country, inaugurating a new program to encourage inventions.

The purpose of the new invention award plan is to give special recognition to individual IBM inventors who contribute significantly to the company's technical position as well as to IBM's efforts to advance the scientific and technical community.

PROMOTION MANAGER AT HYDRO-LINE

Arthur D. Charboneau has been appointed sales promotion manager for Hydro-Line Manufacturing Co., Rockford, Illinois. He will co-ordinate machine tool sales, supervise sales training, and extend special customer service. He has been the company's factory sales representative in the Detroit area for the past 3½ years.

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By Harry L. Stewart. This fine book discusses in practical terms some of the problems involved in developing automatic equipment for such specific operations as assembly of components and packaging of individual products. Valuable to both management and production personnel as well as designers and development engineers. Its intensely practical approach to complex mechanical problems will appeal to all who are confronted with automation problems. 416 pages, price $8.50.

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By J. G. Henderson. Contains over 4,500 easy to understand definitions and descriptions of all the most common metallurgical terms with full cross reference entries of related terms. Indispensable to anyone in the metal or metal working fields who need a convenient source of instant information. 408 pages, price $10.00.

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By William Rostaker, Harold Markus and Joseph M. McCaughey. A complete review and evaluation in one new book covering all information on embrittlement by liquid metals with much never before published data on research. A "must" for engineers working on the design of systems in liquid metal environments, nuclear energy, welding, soldering and brazing. 179 pages, price $7.95.

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By Robert J. Bibbero. An encyclopedic dictionary of automatic control terms providing a condensed discussion of each topic, including applications and related subjects. Features classified index with subject breakdown permitting use as conventional dictionary or use to locate precise word or phrase not known. 296 pages, price $6.00.

HANDBOOK OF FASTENING AND JOINING METAL PARTS

By Vallary H. Laughner and August D. Hargan. A handy guide for comparing various techniques to fasten or assemble a product. Use of screw thread and nuts, various types of welding, collars, couplings, keys, brazing and soldering is described in detail with data on standards, suitability of various methods for different metals and dissimilar metals and strengths. A "must" for design engineers. 622 pages; over 3,500 illustrations, Price $20.00.

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Automatic machine feeds four components and lines them up at rate of 140 per minute.

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New base provides up to 10% more electrical and thermal conductivity.

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Report on two new machines, one of which is used to speed welding of electrical contacts.

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Provide positive retention of case top, as well as easy access for servicing.

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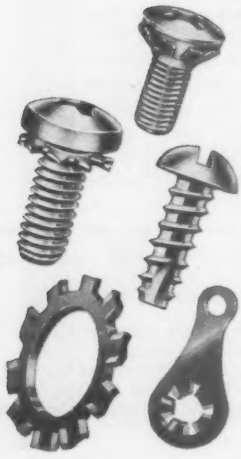

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ONE LAST WORD

80,000 OR 80,000,000 UNEMPLOYED?

A Detroit laborite, in a recent statement, blamed 80,000 of Detroit's unemployed on that beast of capitalistic parentage—automation. This being not an entirely original symphony to our ears, we were inclined to yawn and to dismiss it as the usual political butterfly chasing. But, because we've heard similar indictments of automation, it might not be amiss to pose a very simple question regarding this subject.

How many would be unemployed if we had no automation? 80,000? 80,000,000? If all automobiles, refrigerators, stoves, pens and pencils had to be produced with the line-shaft equipment of 1930, how long would the bread lines be today? Would we have 60 million gainfully employed Americans, in spite of a recession?

To belabor this thought further, if no technological changes had occurred in the last 50 years, there would be no automobile, appliance and aircraft industries. We would be a nation of farmers, buggy-whip makers, blacksmiths, coopers and stable-keepers. These noble and time-honored professions, at which we throw no stones, could scarcely support a nation of 180 million people. No, neither technological progress nor scientific advances can be talked to a halt by labor leaders; nor can they be arrested because they cause temporary unemployment, much as we grieve over this fleeting side effect. Progress of any kind, in any form, in any endeavor is like life, advancing with measured but irrevocable step, moving from crag to crag, from peak to peak, ever toward the light. No Hercules can stay this march, no labor leader can divert it, and no institution can change it.

Aside from the philosophical aspect of automation, and to return the subject to earth, let us consider one bald, awful fact: automation, or advanced mechanization, whatever one may call it, is a national necessity. It is a desperate, urgent need. Unless we push improvement of our productive facilities through automatic methods, we might as well pull the switch now and lock the door before world-wide competition does it for us. The answer to increased employment lies in more, not less, automation. A healthy economy grows out of modernization of plant and equipment, increased productivity and lower prices. And actually, no one knows this better than our labor bosses.

Wm. F. Schleicher

Vice President & Editorial Director

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